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ABSTRACT

This report addresses a variety of questions about inequalities in school finance, and answers them by applying a broad range of statistical techniques to a comprehensive set of data on California school districts. Census data by school district was drawn from the 1970 U.S. Census, while information on school district finance for 1971-72 was obtained from official state sources. Although the report describes research relating almost solely to public school finance in California, it can also serve as a model for the analysis of school finance in other states. A basic question/answer format is used throughout the report, and extensive use is made of illustrative graphs and data tables. In addition to a general introduction, the report contains four major sections dealing with dimensions of inequality, distribution of inequality, sources of inequality, and remedies for inequality. (Author/JG)

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INEQUALITY IN CALIFORNIA SCHOOL FINANCE: DIMENSIONS, SOURCES, REMEDIES

PREPARED UNDER A GRANT FROM THE FORD FOUNDATION

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PREFACE

Who is affected by inequalities in local school finance? What are the sources of these inequalities? What are the probable effects of some of the proposed remedies? This report is intended to answer these questions by drawing upon a wealth of available data and a variety of statistical measures of inequality. A major shortcoming of many previous analyses of variations in school expenditures, and their relationship to property wealth, has been a concentration on observations based on a limited subsampling of school districts, and the uncritical use of measures of variability. Another intention of this report, then, is to demonstrate that one's point of view can be distorted by the choice of investigative instruments. Focusing on measures that emphasize the extremes of a distribution can blind one to the fact that most observations are centrally located. The illustrative use of selected observations can suggest relationships that are not, in general, true.

A better understanding of the facts of inequality is certainly necessary for the formulation of viable policies designed to meet the problem of financing our schools in a legally acceptable and equitable manner. Although this report describes research relating almost solely to the financing of public education in California, it can, nevertheless, serve as a model for the analysis of school finance in other states, where results could differ from those presented here.

This is the final Rand report to be published under a Ford Foundation grant for research on the implications of *Serrano*-type court decisions on school finance. Earlier findings have been published under the following titles:

John Pincus (ed.), *School Finance in Transition*, Ballinger Company, Cambridge, Mass., 1974.

Arthur J. Alexander and Gail V. Bass, *Schools, Taxes, and Voter Behavior: An Analysis of School District Property Tax Elections*, The Rand Corporation, R-1465-FF, April 1974.

Arthur J. Alexander, *Teachers, Salaries, and School District Expenditures*, The Rand Corporation, R-1588-FF, October 1974.

The author would like to acknowledge the earlier work of his colleague James P. Stucker, who initiated this research and was instrumental in compiling the data on which much of the analysis is based. Anthony Pascal and Stephen J. Carroll of Rand offered perceptive and critical reviews on an early draft of the report.

SUMMARY

Who is affected by inequalities in school finance? What are the chief causes of these inequalities? What is the likely impact of proposed remedies for inequality? This report addresses the kinds of questions about inequalities in school finance that a concerned citizen might ask, and answers them by drawing upon a broad range of statistical techniques applied to a comprehensive set of data on California school districts. Census data by school district came from the 1970 U.S. Census, while information on school district finance for 1971-72 was obtained from official state sources. These data do not reflect the impact of the Property Tax Relief Act (S.B. 90) and a companion act (A.B. 1267), which first took effect in 1973-74 and changed many of the paramete- of state aid.

Who is affected by inequalities in school finance?

One of the strongest findings of this study is that most definable groups--whether classified by income, race, ethnic group, or urban status--are distributed across high- and low-spending school districts in similar proportions. Variations and inequalities within any group are much greater than the differences between groups. Moreover, the large metropolitan areas of Los Angeles and San Franciso do not dominate these results: When these school districts are dropped from the sample, little is changed with respect to differences in expenditures across the various groups.

The study also shows that the commonly cited example of educational expenditure differences between a wealthy district with rich residents (e.g., Beverly Hills) and a low-wealth district populated by relatively poor people (e.g., Baldwin Park) does not provide a true picture of the more than 1000 districts in California. The overall relationship between average family income in each school district versus the district's level of per pupil expenditures is very close to random.

What are the major causes of inequalities in educational expenditures?

Most of the variation in locally raised revenues per pupil (55 to 60 percent of total expenditure in 1971-72) is accounted for by assessed property values. The simple correlation between these variables is 0.85. State aid helps to compensate for the extremely wide disparities in property values across districts, but substantial variability still remains in total expenditures. (The correlation between state aid and locally raised revenues per pupil is -.71.)

Residential property is most important in explaining the variability in total property (in a subsample of 136 school districts for which a breakdown of property types was available). Residential property represented two-thirds of all property in this subsample and had the highest variance across districts. (These calculations are based on weighted observations.) If the different types of property were removed from local control and redistributed statewide on an equalized basis ("splitting the tax rolls"), redistribution of residential property would reduce inequality more than would redistribution of industrial property.

Paradoxically, residential property per capita is closely related to family income, whereas total property (of which residential property is 67 percent) is uncorrelated with income. The reason is that other categories of property--especially industrial and farm--are negatively related to income. The positive relationship between income and residential property is thus offset by the negative relationship with the other property components, resulting in an essentially random correlation between total property and income.

All the measures of inequality are greater across small districts than across large ones, and the composition of the property base also varies considerably with district population. Industrial property is a larger proportion of total assessed value in the smallest districts (28 percent) than in the largest (11 percent), and its variability is also much larger in the smallest districts. This probably accounts for the widespread, but wrong, notion that industrial property is the primary source of inequality throughout the school finance system.

[illegible]

[illegible]: Narrowing the tax base by permitting districts to tax only residential property would do little to remove overall inequalities in educational finance and could, in fact, cause greater variability. However, one effect of splitting industrial property from the local tax base would be to reduce the extreme variations by compressing the range of values.

[illegible]: Since variability decreases as district size increases, unification or consolidation would certainly reduce the variability in school finance. A major effect would be to lessen the disparities in extreme property wealth and educational expenditure. There would be little effect, however, on the more aggregative measures of inequality, because most pupils are already members of large school districts. Although more than half of all districts have populations of less than 5000, these districts account for only 6 to 7 percent of all pupils. In districts with very high or very low wealth and expenditures, consolidation will help to eliminate these extremes, but it will not affect the majority of pupils.

[illegible]: Expenditure ceilings as low as \$1200 per pupil would effect only a handful of pupils at the extreme high end of the expenditure distribution. The strongest and most directly observable consequence would be to eliminate the most glaring disparities. On the other hand, an expenditure floor of \$900 per pupil (in 1971-72) would reduce inequality by 25 percent (as measured by standard deviation), would raise spending for 70 percent of all pupils, and would cost more than \$300 million. A \$700 floor would affect only the extreme low end of the expenditure distribution. Senate Bill 90, in fact, established a "quasi-floor" in the \$800 area. It was more than cosmetic in effect, having a significant impact on inequality without bankrupting the state.

[illegible]: Several district power-equalizing plans were investigated for unified school districts. The power-equalizing concept calls for a state-guaranteed uniform property base for each school district such that a given local property tax rate would

raise identical amounts throughout the state. Low-wealth districts would receive state funds to make up the difference between their actual revenues and those guaranteed by the state, and high-wealth districts would turn over excess revenues to the state.

The first plan analyzed was one that would equalize the property base at the statewide average and maintain the average level of state aid. The model showed that all measures of variability would be reduced, but it predicted that the highest-spending district would spend more than twice as much as the lowest. The reason is that even when the effects of random variations in property value are removed, personal income and local tastes for education are still allowed to express themselves in the demand for education. Imposition of a $4 minimum tax rate, in a variant of this plan, would force districts to raise at least $520 per pupil through the property tax and would eliminate the quite low expenditure levels that some districts would choose under a pure power-equalizing plan.

The wide variation in unconstrained district behavior is demonstrated in another plan, which would increase the guaranteed tax base by more than 50 percent (from $13,000 per pupil to $20,000) but would eliminate all other state aid. Average expenditure levels would be higher than the actual 1971-72 levels, but variability would be reduced only slightly.

These alternative plans indicate that power equalizing, when associated with state aid and minimum tax rates, can attain a very high degree of equalization, but that a pure power-equalizing plan in the absence of these other features would not necessarily reduce the variability in expenditures, although it would eliminate many of the inequities in today's school finance system based on the property tax.

CONTENTS

I. INTRODUCTION

Many questions have been raised in recent years about inequalities in the financing of public elementary and secondary education. A number of answers have been published--in judicial decisions, scholarly journals, and popular articles--but most of them have been based on analyses of only summary statistics, selected and limited samples, extreme observations, or reasonable but untested assumptions. It is the purpose of this study to address the type of questions about inequalities in educational finance that a concerned citizen might ask, and to answer them by the use of a broad range of statistical techniques applied to a rich set of data on California school districts. The answers to these questions are structured so as to provide a simple response in the first sentence or paragraph, and a more complete response in the following discussion. In this way, it is hoped that a spectrum of individual interests, from the casual to the professional, can be accommodated.

Before proceeding with the questions and answers, it will be useful to describe the system of financing schools in California, the legal status of that system, and the data used in this report. The rest of this section is therefore concerned with institutions and data. Section II examines the reasons for being concerned with inequality as well as with the simple dimensions of the phenomenon. Section III considers those classes of the population affected by inequalities, and Section IV examines several sources of inequality. Some proposals for remedying inequality are then reviewed in Section V, and their relative ability to solve the perceived problems is assessed.

INSTITUTIONS

California school districts are of three types: elementary, high school, or unified. Typically, several independent elementary districts (responsible only for elementary school education) are found within the boundaries of a single independent high school district (responsible only for high school education). Unified districts combine both kinds

of education within a single administrative unit. Each district elects its own school board, raises revenues from the local property tax base, and determines local educational policy. There are more than 1000 school districts in California. About two-thirds of them are elementary districts, with 24 percent of the pupils. The other third comprises the high school districts, with 11 percent of the pupils, and the unified districts, which represent 22 percent of all districts and 65 percent of the pupils. The existence of three types of districts means that the usual measure of district wealth--property value per pupil--will be larger for elementary and high school districts than for unified districts, and, because the total property tax base is divided by fewer students in the elementary and high school districts, the tax rates will be lower. Because of this institutional feature, the type of district must often be taken into account in analyzing school finance.[1]

The California system of financing public education is similar to that found in many other states.[2] A "foundation program" guarantees every pupil in the state a "minimum acceptable level of school support." For the 1971-72 time period analyzed in this report, the foundation program provided an expenditure floor of $355 for each elementary pupil and $488 for each high school pupil.

State aid is divided into two main segments, "basic aid" and "equalization aid." Basic aid is a flat grant of $125 per pupil per year. Equalization aid is determined by the amount of revenue generated through local property taxes by the application of a computational (hypothetical) tax rate ($1.00 for an elementary pupil and $.80

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[1] In some instances, calculations are made on a *per-pupil* rather than on a *[illegible]* basis. This technique allows the pooling of all school district observations and simplifies the analysis.

[2] The California financing system (as of 1971) is described more fully in Stephen M. Barro, *Alternatives in California School Finance*, The Rand Corporation, R-663-RC/CC, May 1971. This system and the changes brought about by S.B. 90 in 1972 and A.B. 1267 in 1973 are summarized in the "Findings of Fact and Conclusions of Law," *Serrano* vs. *Priest*, The Superior Court, County of Los Angeles, August 30, 1974 (No. 938,254). Much of the above description is taken from these two sources.

for a high school pupil).[3] If the sum of the basic-aid grant and the revenues from the computational tax is less than the foundation program, the state contributes the difference from its general funds.

Prior to the 1973-74 school year, statutory ceilings limited the tax rates that local districts could levy.[4] These tax rates, however, could be exceeded by a tax override approved by a majority of voters in a district tax election. Almost all school districts have found it necessary to exceed the statutory ceilings through voted overrides. The state education code has also provided for more than 30 "permissive overrides," i.e., special-purpose taxes that a district could impose without voters' approval.

In 1971-72, locally raised revenues accounted for approximately 55 to 60 percent of total revenues, state aid contributed another 35 percent, and federal funds were the source of the remaining 5 to 10 percent.

The Property Tax Relief Act of 1972 (S.B. 90) and a companion act (A.B. 1267) in 1973 changed many of the parameters of state aid, but left the basic finance system unchanged. Taking effect in 1973-74, the foundation program was raised to $765 per pupil at the elementary level and to $950 at the high school level. The computational tax rate used to determine the amount of equalization aid was increased to $2.23 and $1.64 for elementary and high school pupils, respectively. To prevent the state's contribution from being eroded by inflation, the foundation program is to be adjusted annually to compensate for changes in the price level. A new formula, based on per pupil expenditures for 1972-73, is used to determine a revenue limit and, from that limit, a maximum tax rate that may be levied without voter approval. The revenue limits are adjusted upward by inflation factors, except for those districts whose limit is higher than the foundation level. For those high-spending districts, the inflation adjustment decreases in proportion to the degree

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[3]Computational tax rates are intended to encourage at least a minimum local tax effort.

[4]Tax rates are expressed as the amount to be collected from each $100 of equalized assessed value. Assessed values are one quarter of market value.

that the revenue limit is above the foundation level. This formula is intended to both increase expenditures for poorer districts and to "squeeze" downward, in a gradual fashion, the expenditures of wealthier districts (unless overrides are voted). The sharp increase in the foundation level, coupled with the gradual squeeze on the high-spending districts, will eventually lead to a convergence of expenditures and a substantial decrease in inequality. However, the state's courts have found this scheme to be an inadequate mechanism for achieving equality.

SCHOOL FINANCE AND THE COURTS

The California Supreme Court, in the case of *Serrano* v. *Priest*, ruled in August 1971 that the state's system of financing public education failed to meet the equal protection requirements of the constitutions of both California and the United States. The court held that the system "invidiously discriminates against the poor because it makes the quality of a child's education a function of the wealth of his parents and neighbors."[5] This case was shortly followed by similar cases, and outcomes in Minnesota, Texas, and New Jersey repeated the California experience. The first of these cases to reach the U.S. Supreme Court was the Texas case, *San Antonio Independent School District* v. *Rodriguez*. The Supreme Court's decision of March 1973 reversed the Texas state court's findings by a 5 to 4 vote and, by precedent, ruled out the use of the Fourteenth Amendment of the U.S. Constitution as a legal basis for school finance reform.[6]

In overturning the Texas case, Justice Powell--writing for the majority--employed a traditional test for assessing constitutional validity under the equal protection clause of the Fourteenth Amendment. Distinctions made between individuals are presumed constitutional if the challenged laws bear a rational relationship to a legitimate state interest *unless* these distinctions or classifications are "suspect" or *unless* the legislation touches on a "fundamental interest," in which case it is subject to a much more rigorous analysis--a so-called

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[5]96 Cal. Rptr. 601.

[6]93 S. Ct. 1278 (1973).

"strict scrutiny." Under the standard of strict scrutiny, the state must demonstrate a compelling interest that justifies the laws, and it must also demonstrate that the distinctions drawn by the laws are necessary to further its purpose. Much of the argument in *Rodriguez*- and *Serrano*-type cases involves the meaning of suspect classification and fundamental interest. Race and poverty have defined suspect classes in the past, and explicitly defined constitutional rights have been the chief characteristic of fundamental rights or interests.[7] The *Rodriguez* majority stated that strict scrutiny was not called for because (a) the Texas system did not disadvantage any suspect class; and (b) education is not a fundamental right guaranteed by the U.S. Constitution. Since the system bore a rational relationship to a legitimate state purpose, it did not violate the equal protection clause of the Fourteenth Amendment.

Ironically, in the same week as the *Rodriguez* decision was published, the New Jersey Supreme Court, in *Robinson v. Cahill*, upheld a lower court's decision that the state's system of school finance conflicted with the New Jersey constitution.[8] Whereas the U.S. Constitution does not explicitly establish education as a fundamental interest, most state constitutions expressly state the importance of education. In California, where the *Serrano* case was remanded to a trial court to establish the facts, the judge of the Superior Court found that the *Rodriguez* decision did not foreclose an independent examination under the equal protection provisions of California's constitution. Indeed, California's constitution affirms, in at least three instances, the importance of education to the children of the state.[9] The trial court

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[7]Justice Marshall's dissenting opinion argued that a careful reading of recent decisions would show that the Court had, in fact, used much less strict definitions of fundamental interest and suspect classification than was specified in the "traditional" tests.

[8]62 N.J. 473.

[9]Article IX, Section 1, states that education is essential to the rights and liberties of the people. Article IX, Section 5, requires that the legislature shall establish a system of common schools. Article XIII, Section 15, provides that before the revenues of the state can be used for any other purpose, there must first be set aside moneys to be applied in support of the public school system.

subsequently found that the finance system, including the changes wrought by the S.B. 90 and A.B. 1267 legislation, violated the equal-protection-of-the-laws provision of California's constitution. The state's role in the drawing of school district boundaries (which caused variations in the distribution in local property wealth), together with the body of law that establishes the system of financing schools in California (which permitted the wealth disparities to be transformed into expenditure inequalities), was found to be in conflict with the requirements for equal protection. Interestingly, Judge Bernard Jefferson, in his decision, defined the class of injured parties as those "children attending low wealth school districts" rather than "poor" children, as in the original *Serrano* decision. As will be shown below, this definition fits the facts better than the earlier claims of injury to the poor. The court specified a 6-year period for the gradual elimination of wealth-related disparities in expenditures, which were defined to mean per-pupil-expenditure "amounts considerably less than $100 per pupil" (apart from the categorical aids and special-needs programs).[10] Thus, the state of California has been given a mandate for change by the courts.

DATA

The data on which this study is based are for California school districts. Figures on school district property values, tax rates, revenues, expenditures, and attendance were obtained for the 1971-72 school years from official state sources. At the time that this report was written, information on the impact of the new legislation (S.B. 90 and A.B. 1267), which took effect in 1973-74, had not yet been compiled. Much of the analysis is therefore confined to the prereform situation. In Section V, however, some of the effects of the legislation are predicted and discussed in conjunction with other potential changes in the system. Census information on housing, income, and socioeconomic characteristics is available for most school districts from the 1970 U.S. Decennial Census. For school districts in

[10] "Findings of Fact and Conclusions of Law," op. cit.

8 (of 58) counties, the Consultant Staff of the California Senate Select Committee on School District Finance disaggregated total property value for 1971-72 into several land-use categories.[11] Four categories were used for this study: residential, farm, industrial, and commercial.

Information from these various sources has been compiled into a comprehensive data base on California school districts. The data base is somewhat biased, however, because the smallest districts are not completely covered by the Census. Nevertheless, the Census does cover more than 700 districts representing more than 95 percent of all pupils in the state, and coverage is complete for the school finance data. The 8-county property subsample categorized by the Committee includes 178 districts and more than 20 percent of all pupils. Because the data base was compiled from several different sources with somewhat different coverage and definition, minor variations may appear in some of the statistical results reported in this study.

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[11] The counties for which data were received are Alameda, Contra Costa, Kern, Marin, San Francisco, San Mateo, Santa Barbara, and Santa Clara.

II. DIMENSIONS OF INEQUALITY

In American society, significant differences in the provision of public education are contrary to our laws and to many of our beliefs about the value of education. Our perception of these differences depends, to some degree, on how we view inequality and on the measures used to analyze it. These two important aspects of inequality are discussed in this section.

* * *

Question: Why is inequality in school expenditures an important issue?

A simple answer to this question is that the issue of interdistrict inequality has been deemed important by state courts in their findings that the present systems of financing schools are unconstitutional. Attempts to respond to the requirements set by the courts have thrust the problem of school finance upon the public in a manner that demands attention, if not actual solution. A broader view of the problem, however, shows that the courts have acted as the vehichles, rather than the initiators, of change. Such change has been deeply desired for more basic reasons than constitutional propriety. Justice Marshall, for example, in his dissent in *Rodriguez*, saw the Supreme Court's decision "as a retreat from our historic commitment to equality of educational opportunity ... which deprives children in their earliest years of the chance to reach their full potential as citizens."[1] Marshall then directed attention not only to the constitutional importance of education, but also to its "societal importance."[2] This belief in the value of education is well illustrated in the historic school-disegregation case, *Brown* v. *Board of Education*, where

[1] 93 S. Ct. 1278 (1973), Dissent (A), p. 1.

[2] Ibid, Dissent (A), p. 30.

the Supreme Court stated, "education is perhaps the most important function of state and local governments. ... It is required in the performance of our most basic public responsibilities. ... It is the very foundation of good citizenship."[3] Given these beliefs, the educational deprivation of some pupils is sufficient to generate a demand for the removal of the inequalities that create it.

A second issue is the inequity in the tax structure across school districts. Taxpayers in property-poor districts are often required to pay higher taxes than those in wealthy districts and yet these taxes provide smaller revenues for their children's education. These two issues--inequality in the provision of educational services and inequity in its financing--have provided a potent stimulus ~~for change that~~ is not confined to courts and judges: it is also reflected in the widespread attempts to alter the present system through state legislatures. These legislative attempts are beginning to succeed, even in states such as Massachusetts where the constitutional requirements for equality are not so demanding as in other states.

The fact that recent social science research has not found a relationship between educational expenditures and educational outcomes does not seem to have seriously impeded the moves toward equalization.[4] Though suggestive, this research has not been fully convincing because of the many theoretical and methodological problems that have not been satisfactorily resolved. For example, the use of standardized test scores as the measure of educational outcomes has been criticized as respresenting only a small part of the educational process, as well as being an imperfect measure of even that which the test scores purport to describe.

Defining what is meant by equal educational opportunities or outcomes is at present so intractable as to lead to an input standard for equalization. The acceptance of inputs or expenditures as the measure of educational equality, although imperfect, accords with the intuition

[3] 347 S. Ct. 483 (1954).

[4] See, for example, Harvey A. Averch, Stephen J. Carroll, Theodore S. Donaldson, Herbert J. Kiesling, and John Pincus, *How Effective Is Schooling? A Critical Review of Research* (Englewood Cliffs, N. J.: Educational Technology Publications), 1974.

of most people. Thus, it is observed that as individuals, districts, or nations become richer, they spend more on education. Since few would be willing to argue that a reduction in expenditures would leave the process unchanged, such behavior indicates an almost universally held belief that more, in education, is better. Before this belief will change, social science research must become more precise and more convincing in its investigations into the relationship between educational inputs and outputs.

Question: What are the dimensions of inequality in school expenditures per pupil?

Expenditures in the highest-spending district in California are more than 10 times greater than those in the lowest-spending district--a difference of more than $3000 per pupil. These are extremes, however, and refer to only a handful of pupils--a little more than a hundred out of a total of more than 4.5 million in California. For a better picture of the dimensions of inequality, one should consider a wider range of information.

The percentages of districts and pupils distributed over the range of per-pupil spending levels in California schools are shown in Table 1. It makes a difference here whether districts or pupils are the subject of analysis. In an analysis of districts, each district has equal value--whether it is large or small. As might be expected, variability in this case is greater than when the observations are weighted by the number of pupils.[5] Consider the differences in per-pupil expenditure between the 5th percentile and the 95th percentile--i.e., the expenditure levels associated with those districts or pupils in the lowest 5 percent of the distribution and those in the lowest 95 percent. There is a difference of $1000 per pupil, according to the unweighted district

[5] The reason for this is that large districts in California tend to fall near the center of the distribution because the variations that might exist between neighborhoods are averaged out over the district as a whole. Smaller districts tend to preserve these differences. Giving the larger districts greater weight in the calculations therefore, tends to reduce the amount of measured variability.

Table 1

DISTRIBUTION OF DISTRICTS AND PUPILS, BY PER-PUPIL EXPENDITURES (1971-72)

Total Expenditures per Pupil ($)	Percentage of Districts	Cumulative Percentage of Districts	Percentage of Pupils	Cumulative Percentage of Pupils
< 575	7.4	7.4	1.7	1.7
575-625	5.8	13.2	2.6	4.3
625-675	8.5	21.8	2.2	6.6
675-725	9.3	31.1	6.6	13.2
725-775	9.5	40.5	10.6	23.8
775-825	10.5	51.0	12.0	35.8
825-875	6.9	58.0	11.4	47.1
875-925	5.3	63.3	24.8	72.0
925-975	5.5	68.9	6.2	78.2
975-1025	4.9	73.7	4.4	82.6
1025-1075	4.5	78.2	3.4	86.1
1075-1125	4.6	82.8	4.9	91.0
1125-1175	2.9	85.7	1.4	92.4
1175-1225	2.2	87.9	1.4	93.7
1225-1275	1.6	89.5	.3	94.0
1275-1325	1.1	90.6	.3	94.3
1325-1375	1.6	92.2	.8	95.1
1375-1425	1.1	93.3	.7	95.9
1425-1475	.7	94.0	.1	95.9
1475-1525	.7	94.7	2.1	98.0
> 1525	5.3	100.0	2.0	100.0

measure, and of $750 when the observations are weighted by the number of pupils.[6] Nevertheless, it is clear that substantial variability exists, whether one looks at pupils or at districts. However, since it is the pupil that is of primary concern, rather than an administrative unit such as a school district, much of the analysis will focus on pupil-weighted observations.

Another way of looking at the distribution of expenditures is to consider the concentration of pupils at midrange rather than at the extreme ends of the range. For example, the middle 80 percent of all pupils (ignoring the 10 percent in the high and low ends) fall between the $700 and $1065 expenditure-per-pupil range, which is considerably less than the extremes mentioned above. Legal analyses must often deal with the extremes of a situation that are repugnant to social values. Politics and policy analysis, on the other hand, recognize and attempt to balance more complex quantities. It is these quantities that are examined in this report.

Question: What are the advantages and disadvantages of the several measures of relative inequality?

The use of several measures of variability can often convey information more effectively and provide a more complete picture of complex distributions than can a single statistic. A number of measures or indicators are used throughout this report and are discussed briefly below. No one of them is completely satisfactory--they all have both strengths and weaknesses.

Minimum, Maximum, Range: One measure of variability is range, which is the difference between the maximum and the minimum extreme observations of a distribution. These measures have an intuitive appeal because they establish the overall boundaries of inequality. However, they do not provide any information about the importance or size of the observations at the extremes, or about the relative degree of clustering, or about how dispersed the interior of a distribution

[6] These numbers are derived by interpolation from Table 1.

may be.[7] Peculiar or extraordinary observations at the extremes of a distribution may bear little relationship to other measures of variability. The statistics maximum, minimum, and range are therefore used here mostly for illustrative purposes.

Percentiles: A specified percentile of a variable is that value of the variable at or below which the specified percentage of the observations lies. The advantage of using the 5th or 95th percentile, for example, is that they both disregard the perhaps unrepresentative observations at the extreme ends of a distribution. Enough percentile measures will, in fact, reproduce the distribution. A disadvantage of this measure is that it is not amenable to algebraic manipulation or statistical inference.

Standard deviation: The standard deviation is a kind of average deviation of the observations around the means, being the square root of the average squared deviation. This measure makes use of all the observations in the sample rather than just those at the extremes or at a certain percentile. For normal distributions, about 66 percent of the observations differ from the mean by less than a standard deviation, 95 percent are within two standard deviations, and more than 99 percent are within three standard deviations. The standard deviation is especially useful for comparing distributions of similar things. It is insensitive to shifts of a distribution because it is measured around the mean. Thus, if the distribution of per-pupil expenditures were shifted by giving each pupil an additional hundred dollars, the standard deviation would not change. It is, however, sensitive to changes in scale. For example, if assessed values were reported at the actual value rather than at a quarter of the value (as is the case), the standard deviation would change by a factor of 4. The standard deviation (and its square--the variance) is the most commonly used measure of variability in formal statistical inference.

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[7] A statistical problem is that the range of a sample drawn from a complete population depends on the sample size. As a sample increases in size, the probability of including an extreme observation also increases.

Coefficient of Variation: This measure adjusts the standard deviation for scale changes by dividing by the mean. The coefficient of variation of property would be the same if the property were reported at market value or at a quarter of market value. However, a shift in the distribution (giving each pupil an additional hundred dollars) would reduce the value of the coefficient of variation. It is useful to interpret the coefficient of variation as a percentage of the mean. The coefficient of variation is particularly convenient for comparing distributions of disparate quantities. For example, the fact that the standard deviations of per-pupil expenditures and per-capita property wealth across school districts is $200 and $1187, respectively, does not provide enough information to assess their comparative inequality. However, a coefficient of variation of 0.2 for expenditures and 0.44 for property suggests that property is twice as variable as expenditures.

Lorenz Curve: The Lorenz curve is a graph showing the proportion of a variable received or associated with the lowest fraction of the population, where that fraction ranges from 0 to 1. Thus, it would show that the lowest 25 percent of all pupils in elementary districts receive 19.5 percent of all expenditures, and that 50 percent of the pupils receive 42.5 percent. Lorenz curves are very useful for comparing disparate samples because they standardize the samples into percentages and display the entire distribution rather than just a selected point or a summary statistic.

Distributions and Scatter Diagrams: These graphical measures are ways of presenting entire distributions for analysis without filtering the data through a statistical screen. Graphs of distributions show the percentage of observations in each interval. Scatter diagrams show the relationship between two variables as a plot of each observation. The advantage of graphical methods is that they enable the viewer to see and absorb a large amount of information quickly and to make complex and subtle distinctions that are not easily shown by computational methods.

Weighting of Observations: The school district was the primary unit of observation for which information was available for this report. But, should each school district be counted equally regardless

of the number of pupils, population size, or other distinction? and does it make a difference? If the question concerns school district behavior, then each district should be given equal weight. If it is about the treatment of pupils, or of the poor, then the district observations should be weighted by the number of pupils or poor people. Different weighting methods can lead to differences in the measures of variability, as was demonstrated in Table 1, and also to differences in the mean of a variable. Thus, the mean value of total expenditures per pupil under different weighting schemes can vary by more than $60: for unweighted district observations, the total expenditure is $907; when weighting is by district population, it is $966; and when weighting is by number of pupils, it is $901.

III. DISTRIBUTION OF INEQUALITY

An often unstated goal of the school finance equalization movement is to increase educational expenditures for certain "target" groups in the general population.[1] The original *Serrano* decision, for example, spoke about the deprivation of the poor. The early evidence collected to test the hypothesis that certain classes (specifically, the poor) were injured by the existing system proved to be disappointing to the equalization proponents. The available statistics did not support the contention that specific groups were invidiously discriminated against. Reflecting these findings, more recent court decisions define the injured class as, simply, those residing in low-wealth, low-expenditure, high-tax-rate school districts. In this section, the impact of inequality on racial, ethnic, and income classes is examined in detail.

It has been hypothesized that families choose to live in localities providing a mix of public services, taxes, and other characteristics that best suit their values and means.[2] If this were the case, the status quo would reflect the most equitable sorting out of people and places--especially since no "suspect" class is singled out for unequal treatment. The legal argument against this possibility is simply the constitutional requirement for equal treatment. Undoubtedly, some people will be made worse off by a change in the system and others will benefit from a windfall gain; but one argument used by the courts is that the choice of place of residence by parents ought not to dictate the quality of education of their children, especially in a system where the state is party to the differentials in quality. So far, though, there has been little support for the belief that [illegible] financed

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[1] One author states that a critical premise on which the court actions have been based is that "the individual wealth of the residents of a school district is directly related to the assessed value of the property in that district." ("A Statistical Analysis of the School Finance Decisions: On Winning Battles and Losing Wars," *Yale Law Journal*, Vol. 81, 1972, p. 1304.)

[2] C. M. Tiebout, "A Pure Theory of Local Expenditures," *Journal of Political Economy*, Vol. 64, No. 5, October 1956, pp. 416-424.

disparities in education are unconstitutional, although this tenet is gaining acceptance in Great Britain with respect to elite schools.

* * *

[illegible] in school district ex-[illegible]

Everyone--the rich, the poor, and the welfare recipient; black, brown, and white. It is one of the surprising findings of research into educational finance in California that most definable classes of the population are distributed across high- and low-spending school districts in similar proportions.

In Fig. 1, the percentage distributions of five population groups are shown over the range of school district expenditures per pupil. There is no preponderance of any class at either end of the distribution. Although these groups may not live next to each other in the same neighborhoods, or even in the same school district, there is little difference across groups in the amount of money spent on their children's education over the state of California as a whole.

The pattern of expenditures across groups of pupils is quite similar to the distribution by population groups. A separate distribution of pupils (rather than people) was classified by racial, ethnic, and welfare status on the basis of 1969-70 data, and the results were almost identical to those shown in Fig. 1.[3] Interestingly, children from welfare families (those receiving Aid to Families with Dependent Children) were slightly, though not significant statistically, over-represented in the richest districts and under-represented in the poorest districts.

Table 2 gives a breakdown of the population groups residing in school districts classified by different levels of expenditures per pupil. The distributions are much the same as in Fig. 1, except that

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[3] This distribution is not shown because it was quite similar to the distribution in Fig. 1.

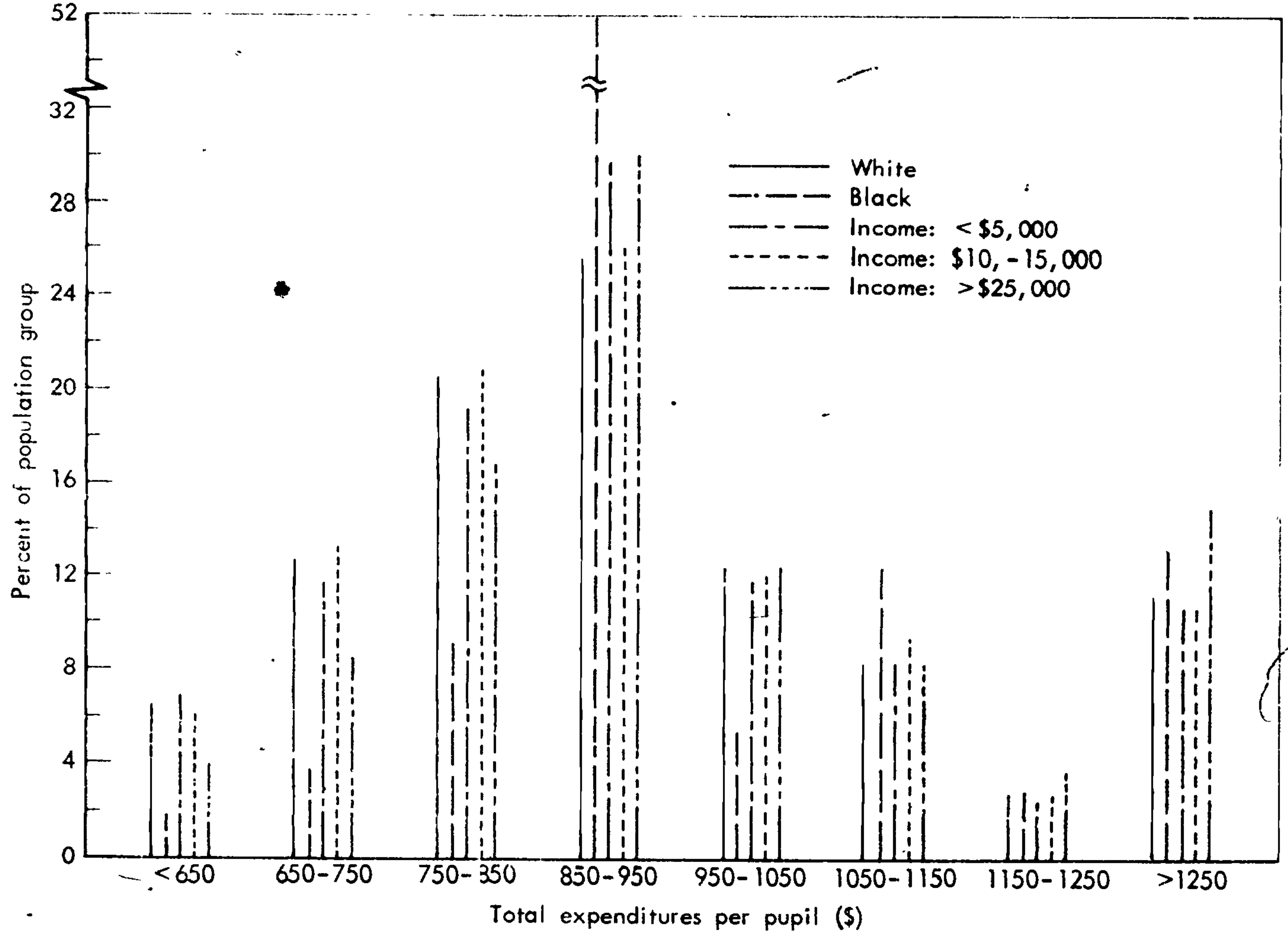

Fig. 1--Distribution of population groups, by school district per-pupil expenditures, for 723 districts (1971-72)

Table 2

DISTRIBUTION OF POPULATION GROUPS, BY PER-PUPIL EXPENDITURES (1971-72)

Total Expenditures per Pupil ($)	Number of School Districts	Total Population (%)	Black (%)	White (%)	Other (%)	Families with Incomes of-- < $5000 (%)	$5000-$10,000 (%)	$10,000-$15,000 (%)	$15,000-$25,000 (%)	> $25,000 (%)	Average Family Income ($)
0-700	178	9	2	9	7	9	9	9	8	6	10,245
700-850	226	26	11	27	21	25	26	27	26	20	10,753
850-1000	131	33	54	33	35	36	34	33	33	37	11,500
1000-1150	104	16	17	16	14	16	16	16	17	17	11,914
> 1150	84	16	16	15	23	14	15	15	16	20	13,026
Totals	723	100	100	100	100	100	100	100	100	100	

families in the highest-income class tend to be found in slightly higher percentages in the highest-spending districts. The number of blacks in the lowest-spending districts are disproportionately low, primarily because these poor districts are in rurual areas where few blacks live. The black population is concentrated in the large urban districts, which are usually closer to the average levels of expenditure.

Question: How can the results presented above be reconciled with the examples so often used of wealthy districts with rich residents (such as Beverly Hills) and the low-wealth districts populated by relatively poor people (such as Baldwin Park)?

What is true of two districts is not true of the more than 1000 districts in California. Figure 2 plots the average income for each district against that district's level of expenditures. The scatter of points is as close to randomness as one could find.[4] The two school districts that are so often used as examples in discussions of school finance--Beverly Hills and Baldwin Park--are identified in the figure. The use of examples of that type epitomize the danger of generalizations based on extremely limited numbers of observations.

Question: To what degree are these findings characteristic of the state as a whole, or are they dominated by the large metropolitan areas of Los Angeles and San Franciso?

Or San Diego? Or Oakland? Or Fresno? Or Bakersfield? Los Angeles and San Franciso account for approximately 18 percent of all pupils in the state. Los Angeles, at $920 per pupil, spends close to the statewide average, whereas San Francisco, at about $1500 per pupil,

[4] When the influence of assessed value is removed from the determination of expenditures, a relationship between income and expenditures emerges, as is shown later in this report.

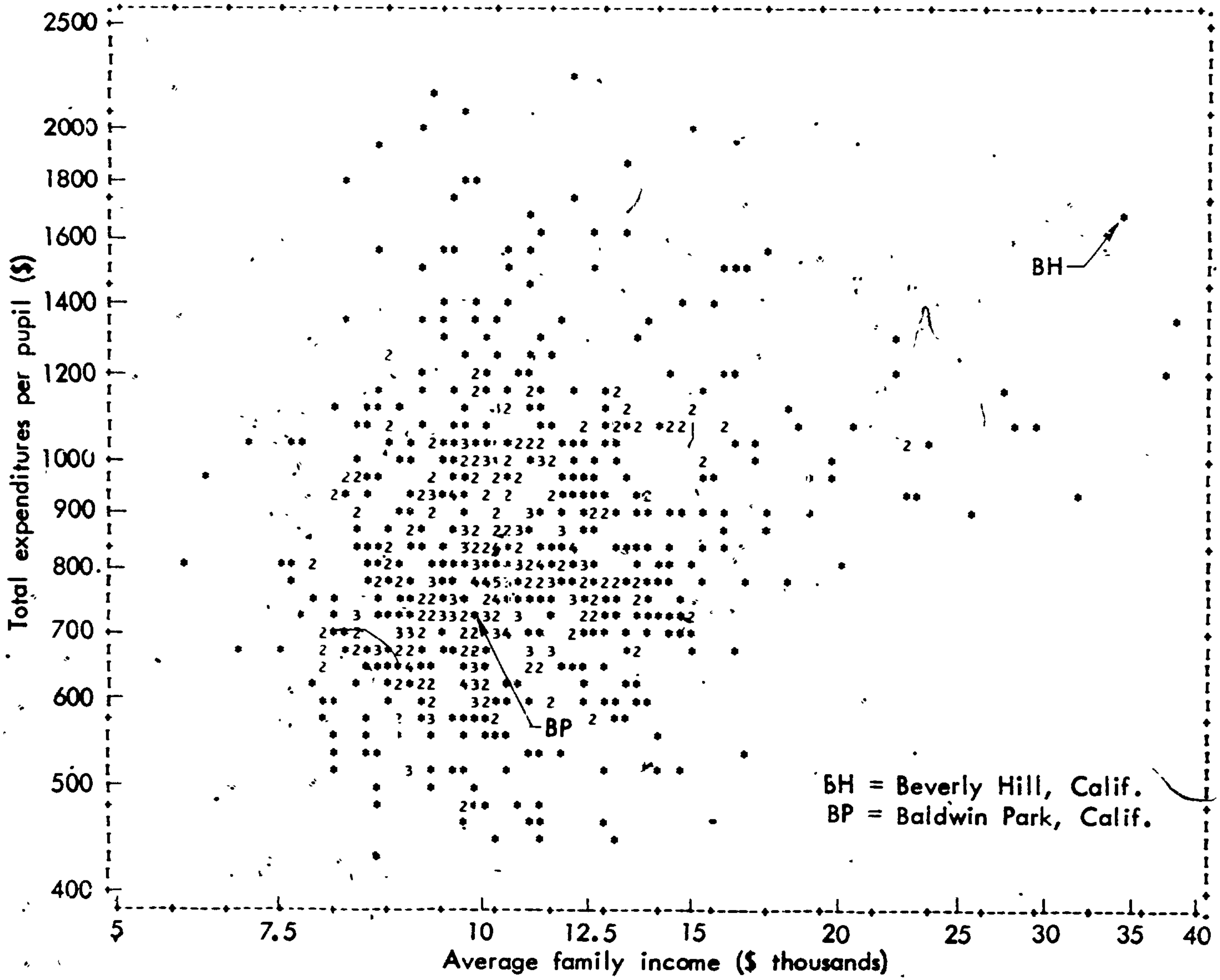

Fig. 2--Scatter diagram of total expenditures per pupil versus average family income for 720 school districts (1971-72)

is in the right-hand tail of the distribution. However, there is little reason to eliminate either district from the statistics, except to answer the question of what the figures would look like with these cities not included. When they are dropped from the calculations, little is changed with respect to differences in expenditures across the classes discussed above. The principle effect is to smooth out the distribution around the mean and to eliminate the bulge in the right-hand tail. Table 3 presents many of the same statistics as Table 2, except that Los Angeles and San Franciso are eliminated from the sample.

[illegible]estion: A matter of concern in many discussions of educational [illegible] is the plight of the urban poor and minorities. How do these groups fare relative to others?

The urban poor do not suffer at all with respect to dollars spent on education when compared with state averages or with other income groups (see Table 4). However, since prices are generally higher in urban areas, dollars do not go as far as elsewhere and needs are said to be greater.[5] The small monetary difference may therefore hide real differences larger than those disclosed by the statistics.

To construct Table 4. school districts were examined in which more than 70 percent of their residents lived in the central cities of urban areas. These districts accounted for about a third of the total population but for more than two-thirds of the black population in the state. This urban sample is compared with the state as a whole in terms of the level of total expenditures and the revenues raised locally through property taxes. Of special concern is the level of expenditures per pupil for urban families in the lowest-income groups. These expenditures are virtually identical with the state average. It is noteworthy

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[5] For evidence that prices are higher in urban areas, see United States Department of Labor, *Three Standards of Living*, Spring, 1967. Also, in California, starting salaries for teachers, as well as clerical and professional salaries, are higher in central cities of urban areas. (See Arthur J. Alexander, *Teachers, Salaries, and School District Expenditures*, The Rand Corporation, R-1588-FF, October 1974.)

Table 3

DISTRIBUTION OF POPULATION GROUPS, EXCLUDING LOS ANGELES AND SAN FRANCISO, BY PER-PUPIL EXPENDITURES (1971-72)

Total Expenditures per Pupil ($)	Total Population (%)	Black (%)	White (%)	Other (%)	Families with Incomes of--				
					< $5000 (%)	$5000-$10,000 (%)	$10,000-$15,000 (%)	$15,000-$25,000 (%)	> $25,000 (%)
0-700	10	4	10	10	11	11	10	9	7
700-850	31	20	32	30	31	31	32	31	25
850-1000	24	26	24	24	25	25	25	25	26
1000-1150	19	32	19	20	19	19	19	20	21
> 1150	16	18	15	16	14	14	14	16	21

Table 4

COMPARISON OF TOTAL EXPENDITURES AND LOCALLY RAISED REVENUES BETWEEN URBAN DISTRICTS AND ALL DISTRICTS, BY POPULATION GROUP (1971-72)

(In dollars)

Population Group	Total Expenditures per Pupil		Locally Raised Revenues per Pupil	
	All Districts	Urban Districts	All Districts	Urban Districts
Total population	966	960	588	610
White	960	947	581	596
Black	1020	998	649	651
Family income:				
< $5000	959	967	575	618
$5000-$10,000	956	956	572	606
$10,000-$15,000	956	946	581	595
$15,000-$25,000	971	951	606	602
> $25,000	1009	971	662	629

NOTE: Observations are weighted by district population or population groups.

that the standard deviation of total expenditures per pupil is approximately $200 within each of the groups (and for the entire sample), whereas the maximum differences between groups in Table 4 is only about $75. Within the urban districts there are only small differences between the various groups. These differences are hardly significant in a statistical sense and do not denote significant deprivation of the urban poor, or of any other urban group.

Question: Despite the repeated claims here that everyone is in the same, unequal boat, one cannot help noticing that the rich do seem to live in districts that spend more money on education. Do they also pay higher taxes? Where does this money come from?

The tax rates faced by high-income families are no higher, in unified and high school districts, than those faced by families with lower income. In elementary districts, the highest-income families pay, on the average, 9 percent higher tax rates than the lowest-income class. Average property values, however, rise somewhat with income in all types of districts. Table 5 shows the average tax rates and property values per pupil associated with each of the income groups. The differences in tax rates and assessed property values, though, are all rather small. Whereas the groups shown here vary by more than 500 percent in income, the maximum difference between tax rates or property value is only 22 percent. The combined effect of slightly higher tax rates and slightly larger property bases give rich pupils, in general, a slight edge in expenditures.

Table 5

TAX RATES AND ASSESSED PROPERTY VALUE PER PUPIL, BY INCOME GROUP (1971-72)

Income Group	Tax Rate ($ per hundred)			Assessed Value per Pupil ($)		
	Unified Districts	Elementary Districts	High School Districts	Unified Districts	Elementary Districts	High School Districts
Family income:						
< $5000	5.03	3.04	2.45	14,520	17,250	40,420
$5000-$10,000	5.07	3.09	2.49	14,200	17,260	39,840
$10,000-$15,000	5.15	3.22	2.54	13,950	17,490	39,860
$15,000-$25,000	5.17	3.29	2.53	14,320	18,540	41,050
> $25,000	5.08	3.32	2.50	15,870	21,200	43,860

NOTE: District observations are weighted by number of families in income group.

IV. SOURCES OF INEQUALITY

The results of the previous section show that, across school districts, the relationship between income (or other socioeconomic indicators) and school expenditures is either weak or absent. The reason is that the institutional feature of the property tax as the major source of school revenue interposes itself between individuals and their schools. Disparities in educational expenditures and tax rates are easily traced to the highly diverse nature of the value and type of local property. It is not industrial property, as is commonly assumed, but residential property that is most responsible for the great differences in property wealth per pupil. The common assumption about the great variability in industrial property, however, is correct for the smallest districts. Indeed, all of the parameters of school finance tend to become much more unequal in the smaller districts.

* * *

Question: What is the major cause of inequalities in educational expenditures?

Most of the variation in locally raised revenues per pupil is accounted for by assessed property values. Since locally raised revenues amounted to 55 to 60 percent of total revenues (and expenditures) in California, the single most important revenue source is related to that feature of school district finance that exhibits extremely diverse values across the state.[1] This relationship is graphically demonstrated in the scatter diagram of Fig. 3, which shows locally raised revenues per pupil and assessed value per pupil for unified districts. The correlation in this figure is 0.85.

At the extremes, the highest-wealth elementary district is more

[1] Educational finance legislation in 1972 raised the state's contribution from about 35 percent to more than 40 percent.

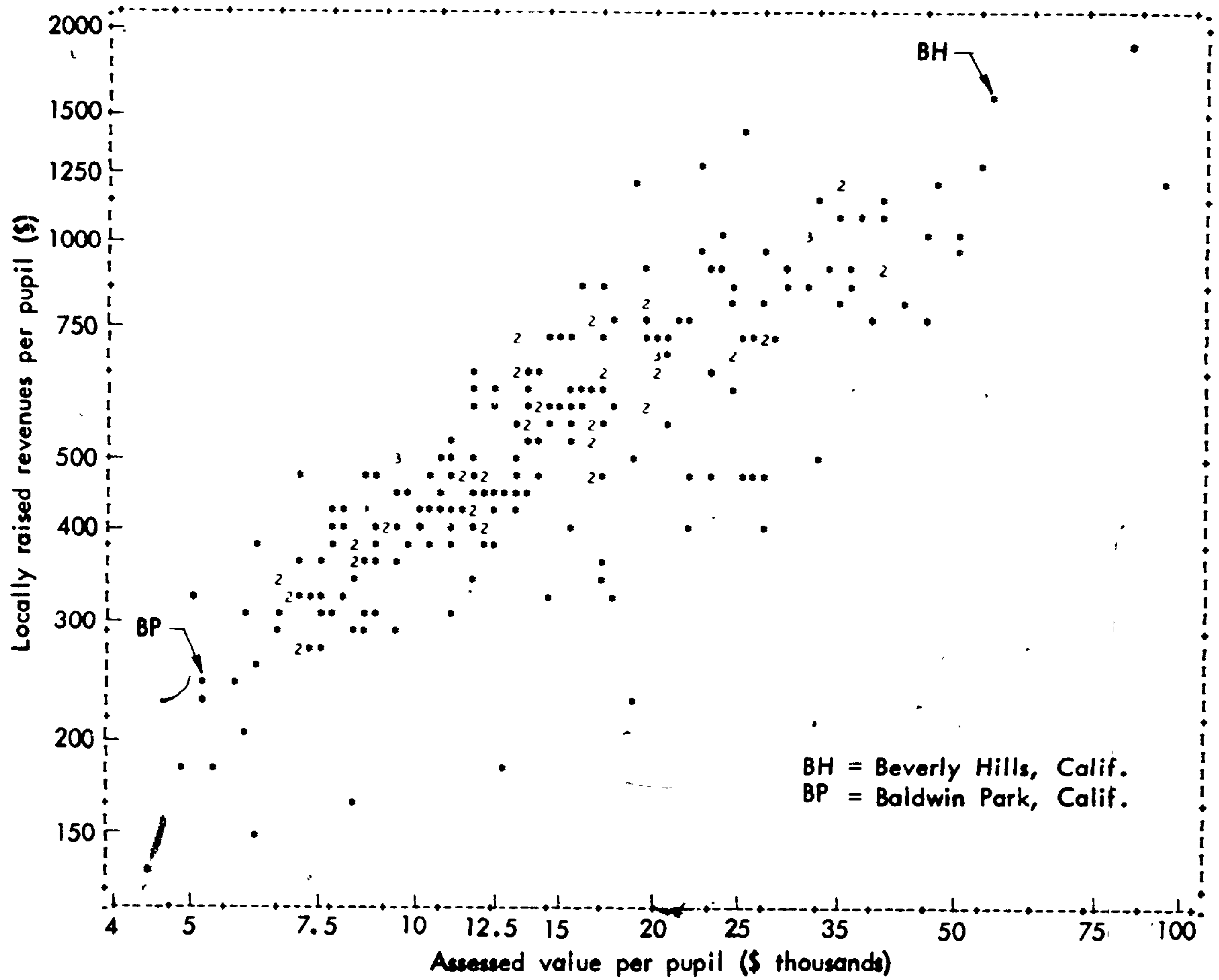

Fig. 3--Scatter diagram of locally raised revenues versus assessed property value per pupil for unified school districts (1971-72)

than 500 times richer than the poorest. Among unified districts, which are much less variable than elementary districts, the richest has 50 times the wealth of the poorest. One can (and should), however, look at other measures of variability in addition to the extremes. Thus, the ratio of assessed value per pupil at the 95th percentile to the 5th percentile is more than 5 to 1 for unified districts.

This great variability in property values is narrowed down to some degree when translated into local revenues, especially at the extremes. Nevertheless, the variation in locally raised revenues per pupil across school districts is still substantial. For example, for unified districts, the ratio of the 95th to the 5th percentile is 4 to 1.

Question: What causes property to be so variable from one district to another?

After examining an array of evidence, it becomes clear that residential property is most important in explaining the variability of total property value. Industrial property is second in importance to residential property, with farm and commercial property having a relatively minor effect on total variability.

Statistics on total property value per capita and the components that make up the total are given in Table 6.[2] First note that residential property constitutes two-thirds of the total property value. The standard deviation of residential property is larger than for any other property component.[3] This is a useful measure of variability for present purposes because it emphasizes the spread of the distribution around the mean for similarly measured variables.

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[2] Because of the limited number of observations for which information on the components of assessed value is available, per capita rather than per pupil figures are used. This permits all school districts to be pooled rather than split into separate subsamples for elementary, high school, and unified districts.

[3] Analysis of covariance shows that 48 percent of the variance of total per-capita property is accounted for by the residential component and 33 percent by the industrial component. For additional discussion of these points, see pages 38 and 41 (below).

Table 6

VARIABILITY OF TOTAL PROPERTY AND ITS COMPONENTS (1971-72)

(District observations weighted by population)

Property Components	Mean ($/Capita)	Percent of Total	Standard Deviation ($/Capita)
Total property value	2715	100	1187
Residential	1817	67	825
Industrial	344	13	679
Commercial	385	14	206
Farm	86	3	303
Miscellaneous	84	3	102

Another approach to the question is to assume that all property of a given type is removed from the jurisdiction of the local school district, placed in a statewide pool, and then reallocated back to the school district according to some equalizing rule. Since per-capita figures are being used here, assume that the property is redistributed on a per-capita basis. In this way, every school district would have the same amount of industrial property (for example) per capita. Table 7 shows the effect of equalizing each of the property components. The standard deviation is reduced by a third when residential property is equalized, and by less than 20 percent for the equalization of industrial property. Lorenz curves of the distribution of total assessed value (unequalized), and of the distributions as equalized for residential property and industrial property, are plotted in Fig. 4.[4] It is clear that equalizing industrial property value affects inequality only slightly, whereas equalizing residential property results in a substantially more uniform distribution.

[4]Lorenz curves are designed to answer the following type of question: What percentage of total property is associated with the lowest ranked 10 percent of the population? Thus, in Fig. 4, the percentage of population is plotted on the horizontal axis and the percentages of

Table 7

VARIABILITY OF TOTAL PROPERTY IF COMPONENTS WERE EQUALIZED ACROSS SCHOOL DISTRICTS (1971-72)

(District observations weighted by population)

Total Property Value	Mean ($/Capita)	Standard Deviation ($/Capita)
Actual value	2715	1187
Equalized for		
Residential	2715	803
Industrial	2715	965
Commercial	2715	1152
Farm	2715	1124
Miscellaneous	2715	1160

The use of [illegible] district observations produces somewhat different conclusions from the weighted analysis discussed above. Unweighted data yield standard deviations of residential and industrial property that are nearly equal. The reason is that the occurrance of a few very large industrial-property values per capita in small school districts sharply skews the distribution of unweighted observations. If one wishes to emphasize district-to-district variability unadjusted for number of pupils or size of population, unweighted observations are the appropriate data.

property, on the vertical axis. In situations of complete equality, 5 percent of the population would be associated with 5 percent of all property, 10 percent with 10 percent of all property, etc. The curve in this case would be the diagonal 45-deg line. The more the curve is bowed out from the diagonal, the greater is the degree of inequality. In the most unequal case possible, only one individual would own 100 percent of all property and no one else would have anything. In this case, the curve would degenerate into the right angle formed by the lower horizontal axis and the right-hand vertical axis.

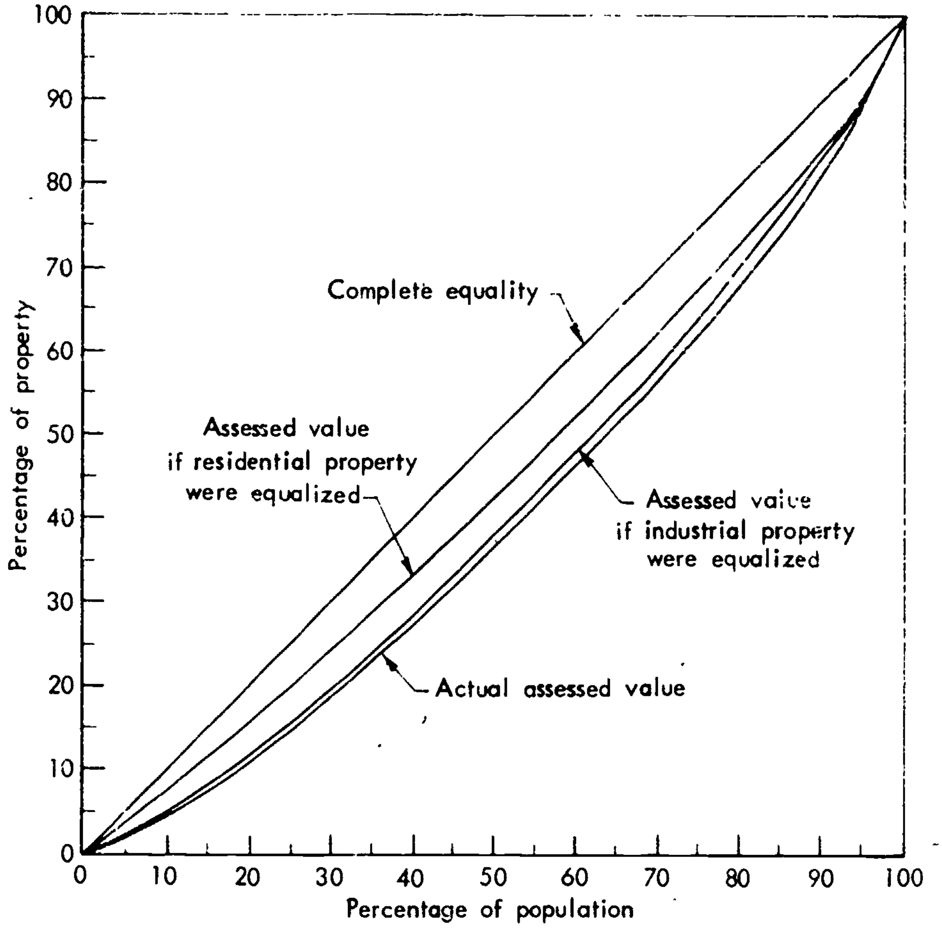

Fig. 4--Lorenz curves showing effect on equality of per-capita assessed value of equalizing residential and industrial property

Question: Does the composition of the property base vary with the size of the district?

There are important differences in the composition of total property across districts of different sizes. Industrial property is a larger proportion of total assessed value in the smallest districts (28 percent) than in the largest (11 percent), and its variability is also much larger in the smallest.[1] This is probably the root of the widespread, but wrong, notion that industrial property is the primary source of inequality throughout the school finance system. What is usually overlooked is that the small districts account for only a few

percent of the population, even though there are about as many small school districts as larger ones.

Districts for which the components of the property base were available were grouped into three size categories, based on total population. Relevant statistics on property components across size categories are given in Table 8. The proportion of residential and commercial properties contained in a district increases with the size of the district, whereas industrial and farm proportions decrease. Total property per capita also decreases with district size, reflecting an increase in the density of the urban population and a decline in industrial and farm activity. It appears that, internally, the smaller districts tend to be more homogeneous, i.e., mostly residential, or mostly industrial, or mostly farming. This internal homogeneity leads to heterogeneity between one district and another. The large districts, on the other hand, are more likely to include several categories of property, averaging out the neighborhood-to-neighborhood variations. Large districts are therefore more heterogeneous internally, but tend to be similar to one another, on the average.

Question: Is there a general relationship between school district size and the disparities across school district finances?

Variability within the category of large school districts is much less than within the category of small districts. For example, the coefficient of variation of assessed value per capita is four times larger in districts with a population of less than 2500 than in those with a population of more than 50,000. This disparity probability occurs because small pockets of wealth or poverty are retained intact in small districts, whereas they are averaged out in large ones. In fact, this is a principal reason why small districts remain small: wealthy districts do not want to merge and perhaps dilute their wealth, and the more affluent districts will not merge with poor districts.

School districts were categorized by size according to their total population; statistics and distributions were then calculated for each category, as shown in Table 9. Virtually every measure of variability

Table 8

TOTAL VALUE OF PROPERTY AND ITS COMPONENTS CATEGORIZED BY SCHOOL DISTRICT POPULATION

Property and Components	5000 Population			5000-25,000 Population			25,000 Population		
	Percent of Total	Mean ($/Capita)	Standard Deviation ($/Capita)	Percent of Total	Mean ($/Capita)	Standard Deviation ($/Capita)	Percent of Total	Mean ($/Capita)	Standard Deviation ($/Capita)
Total property value	100	6267	3910	100	3712	1865	100	2529	768
Residential	41	2586	2407	61	2272	1482	69	1744	601
Industrial	28	1727	3232	19	689	1358	11	278	295
Commercial	6	386	383	9	324	256	16	393	192
Farm	22	1397	1483	8	304	533	2	38	59
Miscellaneous	3	171	318	3	123	187	3	77	74

NOTE: All figures are weighted by district population within a size category; sample size = 136.

Table 9

MEASURES OF VARIABILITY ACROSS SCHOOL DISTRICTS, BY SCHOOL DISTRICT POPULATION (1971-72)

School District Population	Assessed Value per Capita				Local Revenues per Pupil				Total Expenditures per Pupil			
	Mean ($)	Standard Deviation ($)	Coefficient of Variation	Ratio 95th to 5th Percentile	Mean ($)	Standard Deviation ($)	Coefficient of Variation	Ratio 95th to 5th Percentile	Mean ($)	Standard Deviation ($)	Coefficient of Variation	Ratio 95th to 5th Percentile
2500	7290	7280	1.00	16.0	331	318	.96	40.0	769	246	.32	2.5
2500-5000	5630	5100	.90	13.0	373	281	.75	15.0	784	226	.29	2.4
5000-10,000	4670	2910	.62	7.0	459	339	.74	18.8	847	239	.28	2.4
10,000-25,000	3790	2560	.68	9.0	437	265	.61	16.5	852	189	.22	2.1
25,000-50,000	2860	1110	.39	4.5	407	226	.56	6.7	812	173	.21	1.8
50,000	2710	670	.25	2.5	586	229	.39	5.1	951	200	.21	2.0

NOTE: District observations are weighted by number of pupils.

decreases as the size of the district increases. The result is the same when Lorenz curves are used (see Fig. 5).[5] Particularly noteworthy is the sharp decline in variability in both assessed value and local revenues. As will be discussed in more detail below, state education aid goes a long way toward reducing these inequalities, even among the smallest districts, as can be seen from the statistics on total expenditures. However, state aid, as structured during the years that were analyzed, could not equalize the very wide dispersions found in the smallest districts as effectively as in the largest districts. Thus, whereas the Lorenz curves in Fig. 5 show greater equality for total expenditures than for both local revenues and assessed value, there is still a measurable difference between the size categories.

Lest one read too much into these findings, it should be noted that only 3 percent of all students (in the analyzed sample) were in districts having a population of less than 5000, whereas 82 percent were in districts with more than 25,000. The greatest variability therefore affects only a handful of pupils. Nevertheless, inequalities are still substantial even in the largest districts, where differences in total expenditures can amount to $1000 per pupil.

Question: Do state funds, as allocated in 1971-72, serve to equalize the wide dispersion in locally raised revenues that is generated by the variability of property?

State funds even out the worst of the inequalities, principally by adding to the resources of the poorest districts. Nevertheless, substantial inequalities still remain. As the distributions and scatter diagrams presented above have demonstrated, total expenditures per pupil exhibit a wide range of values--differences of more than five to one are seen at the extremes. However, compared with the distributions of assessed values and locally raised revenues, total expenditures are much less variable.

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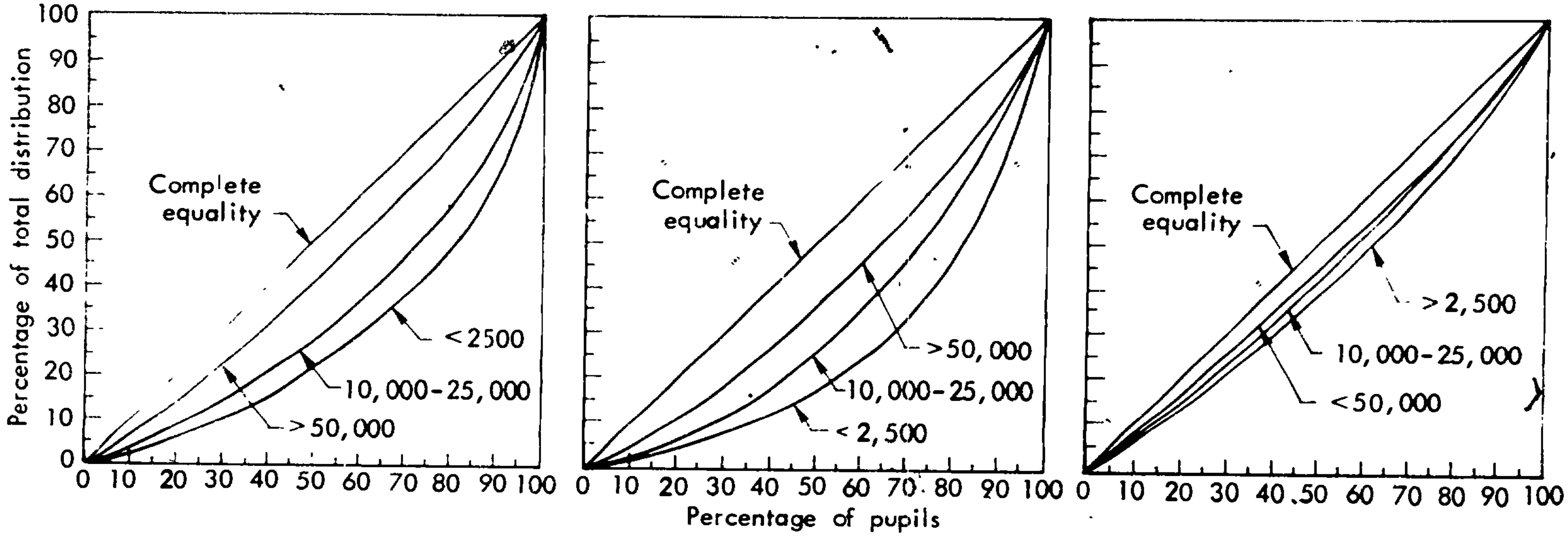
[5]Size categories were merged in Fig. 5 to clarify the curves.



(a) Assessed value per capita (b) Local revenues per pupil (c) Total expenditures per pupil

Fig. 5--Lorenz curves showing inequality in the distributions of assessed value, local revenues, and total expenditures, by district population (1971-72)

In Fig. 6, Lorenz curves are plotted for elementary and unified districts. The curves for locally raised revenues and assessed values per pupil are very close to each other, indicating the same degree of inequality. (Both of these variables are more evenly distributed in the unified districts than in the elementary districts.) Total expenditures per pupil, however, are more equally distributed, with both types of districts having quite similar curves. Since the major difference between total expenditures and locally raised revenues is the contribution from the state, one can identify these state revenues as the factor leading to greater equality of total expenditures. This same effect is observed in the strong, negative correlation between state aid and locally raised revenues of -.71 for weighted observations of unified districts.

Question: Does the strong correlation between locally raised revenues and property value, and the weak correlation between expenditures and income, suggest that there is little relationship between income and property?

Despite the strong link between family income and residential property, there is only a weak relationship between income and total property, which, it must be recalled, also includes commercial, industrial, and farm property. This weak relationship is shown in Fig. 7, where total assessed property per capita in each district is plotted against that district's average family income. The scatter here is essentially random.

Additional information to explain this surprising result is given in Table 10, where it can be seen that the strong correlation of 0.62 between income and residential property is offset by the negative relationship between income and both industrial and farm property. The reason is simple: wealthy people do not live near factories, and the rural population is relatively poor. This point is illustrated even more clearly by means of a regression equation in which the dependent variable is average family income and the independent variables are

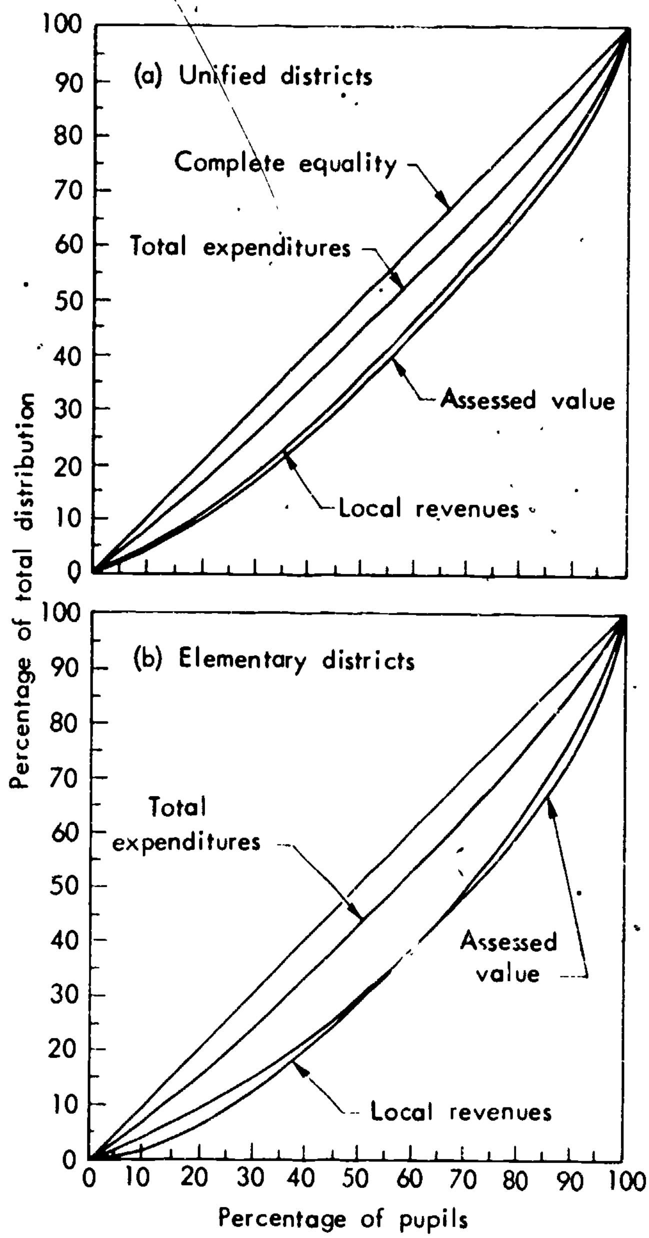


Fig. 6--Lorenz curves showing inequality in distributions of per pupil total expenditures, locally raised revenues, and assessed value for unified and elementary districts (1971-72)

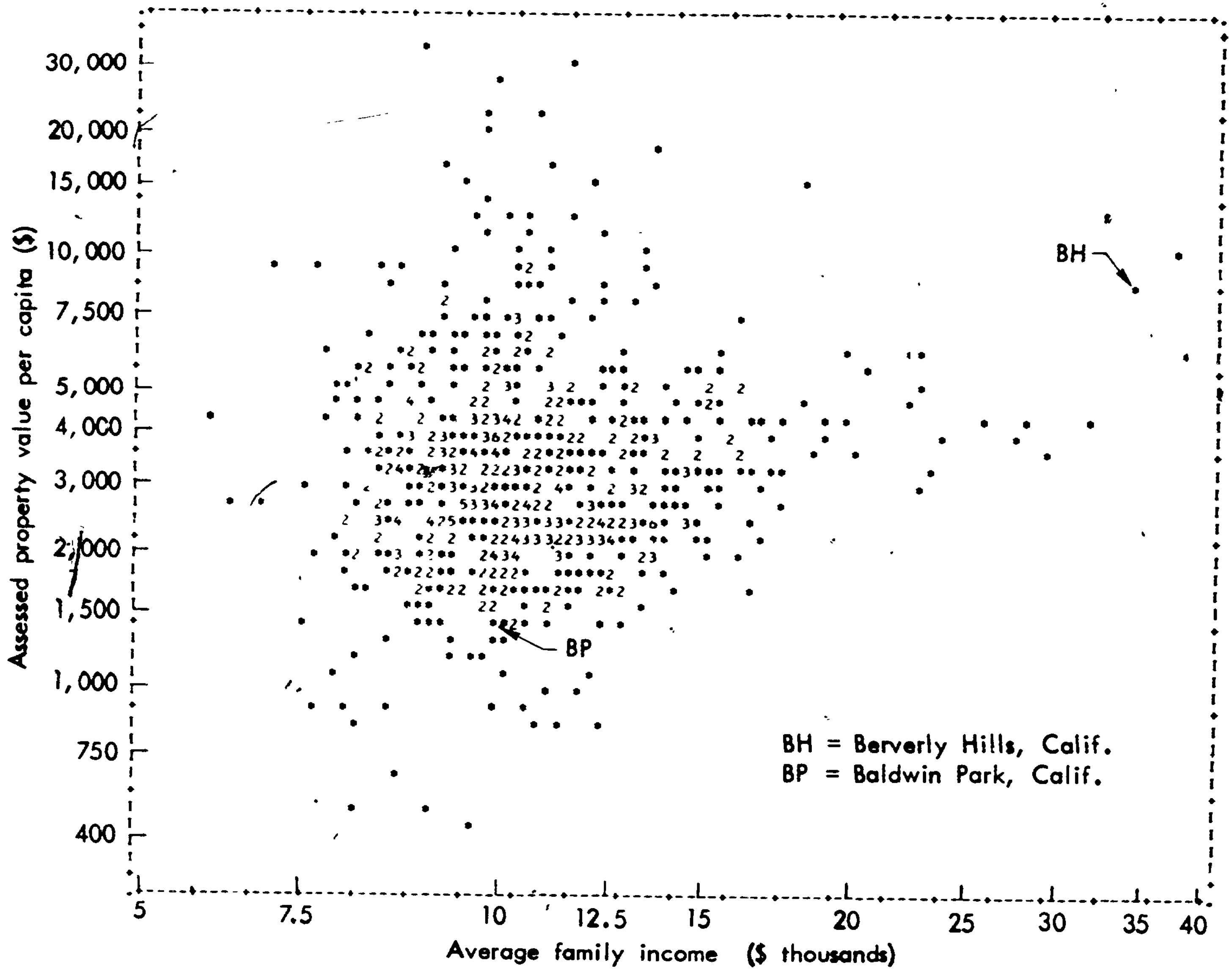


Fig. 7--Scatter diagram of assessed value per capita versus average family income for 720 school districts (1971-72)

Table 10

CORRELATION MATRIX BETWEEN AVERAGE FAMILY INCOME AND PER CAPITA PROPERTY FOR 136 UNWEIGHTED DISTRICT OBSERVATIONS

	1	2	3	4	5	6	7
1. Average family income	1.00						
2. Assessed value per capita	.15	1.00					
3. Residential property per capita	.62	.60	1.00				
4. Industrial property per capita	-.21	.67	-.06	1.00			
5. Commercial property per capita	.06	.25	.24	.05	1.00		
6. Farm property per capita	-.33	.38	-.10	.13	-.10	1.00	
7. Miscellaneous property per capita	.03	.11	.08	-.08	-.02	.14	1.00

the types of property.[6] The coefficients of per capita property, other than residential, are all negative, resulting in a relationship between income and total property that is essentially random.[7]

Question: Do variations in the proportion of pupils in the population contribute in a major way to school finance inequalities?

The proportion of pupils in the population does indeed vary across communities. A school district such as Carmel, California, which is

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[6] The equation is as follows:

$$\text{Average family income} = 11.3 + \underset{(9.5)}{1.79}\ \text{Residential} - \underset{(4.2)}{1.39}\ \text{Farm}$$

$$- \underset{(2.2)}{.40}\ \text{Industrial} - \underset{(1.6)}{2.07}\ \text{Commercial};$$

$$R^2 = .49, \quad N = 136,$$

where family income is measured in hundreds of dollars and property per capita is in thousands; t-statistics are shown in parentheses.

[7] The above result is especially true with respect to unweighted district observations. Weighting by district population raises the correlation between income and total property to 0.34 (compared with 0.15 for the unweighted sample). The major findings remain, in general, unchanged.

populated by older, retired residents, has a ratio of pupils to total population of only 0.16, whereas Las Virgenes, a Los Angeles suburban community of young families, has a ratio twice as great as that of Carmel. These differences, however, tend to be idiosyncratic and have relatively little systematic effect on either tax rates or expenditures, except in the very largest districts.

The distributions of property value per pupil and property value per capita are so similar to each other that their Lorenz curves are virtually identical. The principal reason for this similarity is that the two variables are highly correlated--the simple correlation between pupils and population in unified districts is 0.993. And the correlation between the ratio of pupils per capita and total population is very low--0.08 in unified districts--indicating that the proportion of pupils does not vary systematically with district size. There are disproportionately fewer pupils in the largest districts, however (see Table 11). The smaller proportion of pupils in the large urban districts compensates somewhat for the smaller amount of property value per capita.

Table 11

PUPILS PER CAPITA IN UNIFIED, ELEMENTARY, AND HIGH SCHOOL DISTRICTS (1971-72)

School District Population	Pupils per Capita		
	Unified Districts	Elementary Districts	High School Districts
<2500	.225	.279	.100
2500-5000	.294	.215	.130
5000-10,000	.264	.211	.094
10,000-25,000	.262	.197	.079
25,000-50,000	.265	.193	.080
>50,000	.202	.133	.079

V. REMEDIES FOR INEQUALITY

The effects of alternative policies for dealing with inequalities in school finance are described in this section. Several policies and their effects are implicit in much of the foregoing discussion; here they will be treated explicitly. In some instances, outcomes are important, not the particular mechanisms for achieving them: in others, the mechanisms themselves are of primary interest. In the latter case, a behavioral model of school district expenditures is required to generate the necessary predictions for subsequent analysis.

It is important to note here that the data on which this analysis is based predate important changes in California school finance embodied in legislation in 1972 and 1973. Where appropriate, the impact of these changes will be acknowledged.

No attempt has been made in this study to model the state's school finance system, or possible alternatives to it,[1] in great detail; rather, the intent has been to establish the broad outlines and effects of possible changes. Many of the proposed policies have been supported in the past by arguments of a reasonable but a priori nature. Here I want to draw conclusions grounded in fact; or, failing that, to offer a fortiori assertions buttressed by statistics.

* * *

Question: Would narrowing the tax base by permitting districts to tax only residential property make tax bases more equal?

In general, residential property is distributed more unequally than industrial or commercial property (as shown in Section III);

[1]For a thorough and efficient description of the alternative financing plans that have been proposed, see Stephen M. Barro, "Alternative Post-*Serrano* Systems and Their Expenditure Implications," in John Pincus (ed.), *School Finance in Transition* (Cambridge, Mass.: Ballinger Publishing Co.), 1974.

therefore, "splitting the tax rolls" would not lead to a more equalized tax base. However, one effect of splitting industrial property from the local tax base would be to reduce the extreme variation in property values. This is shown in Table 12, where a policy of equalizing the value of industrial property per capita compresses the range of values from $14,800 to $11,400.

Table 12

EFFECT ON EXTREME VALUES OF EQUALIZING COMPONENTS OF TOTAL PROPERTY PER CAPITA (1971-72)

Property and Components	Minimum ($/Capita)	Maximum ($/Capita)	Range ($/Capita)
Total property value	800	15,600	14,800
Equalized for			
Residential	1,800	16,000	14,200
Industrial	1,000	12,400	11,400
Commercial	1,000	15,200	14,200
Farm	600	15,600	15,000

Another consequence of a policy of equalizing all but local residential property would be its harmful effect on the Chicano population, which tends to concentrate in districts that are rich in industrial property and poor in residential property. Average property value per capita would fall by about $200 for this population group.[2] Blacks, on the other hand, would gain by about the same amount that Chicanos would lose, while welfare families and the white population would remain about the same, on average.

[2]These figures are all based on the limited subsample of 133 school districts for which the split-roll property data are available.

Question: An alternative school finance scheme is to base local school revenues on local personal income instead of on local property wealth. Is personal income distributed more equally than property? Can the effects of such a tax be predicted?

Personal income is more equally distributed than property and most schemes based on a local income tax would probably yield greater equality in expenditures and taxes than that which emerges from the existing system. Figure 8 compares the distributions of property value and family income. If revenues derived from a local income tax were no more unequal than income itself, locally raised revenues would be considerably more evenly distributed than at present. Estimates of the

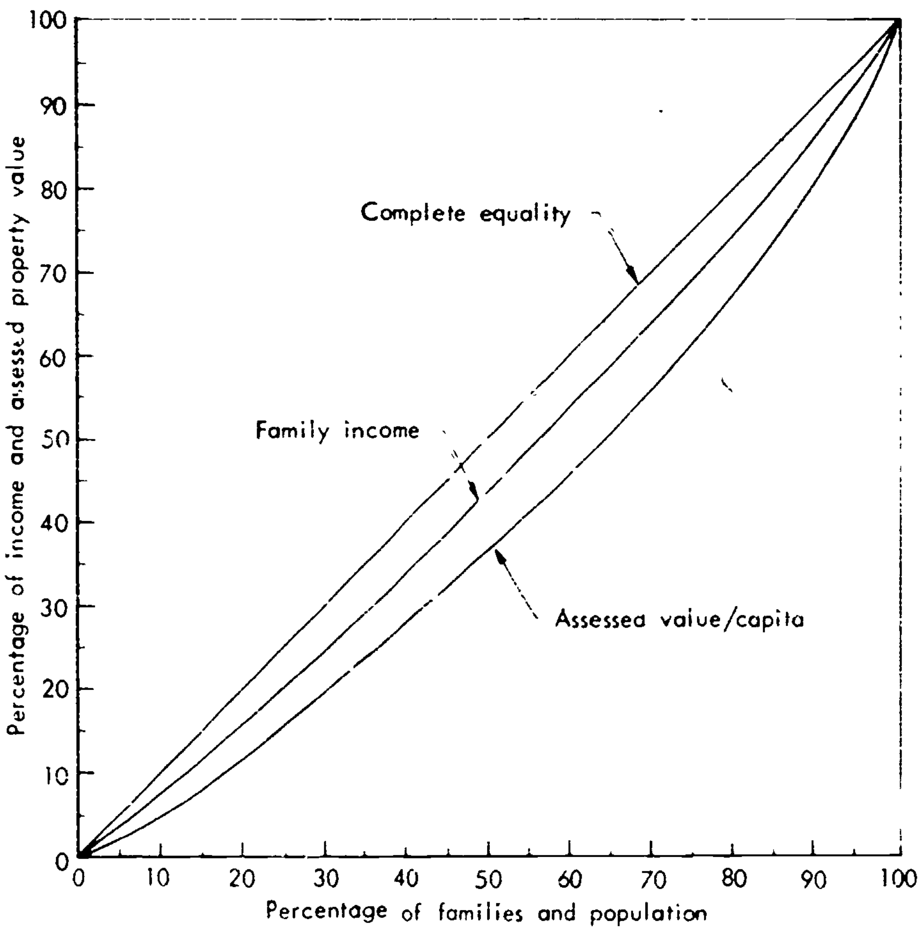

Fig. 8--Lorenz curves showing relative inequality of family income and assessed property value

income elasticity of local educational expenditures are generally less than 1.0 (see equations in Appendix A). Therefore, the proportional differences between districts with respect to revenues would be less than the differences in average family income. If, in addition, state aid continued to have an equalizing role, total expenditures would even be more equally distributed.

Average family income, though, exhibits considerable variability. For example, it ranges from a low of \$5500 to a high of \$32,500. But, more importantly, income is directly related to social class, ethnicity, and race, whereas--ironically--property wealth is distributed with comparative randomness. Therefore, a move toward financing local education from local incomes could generate the very perverse relationships that the school finance equalization movement has been trying to eliminate.

Question: What would be the effect on the distribution of total expenditures if expenditure floors or ceilings were imposed?

Imposing ceilings on total expenditures per pupil would have very little effect on most measures of inequality. The reason for this is that there are few students in the high-spending districts. The strongest and most directly observable consequence would be to eliminate the glaring disparities at the extremes of the system. On the other hand, an expenditure floor of \$900 per pupil would reduce inequality by approximately 25 percent (as measured by standard deviation), would raise spending for 70 percent of all pupils, and would cost more than \$500 million.[3] A \$1000 minimum would cost the state as a whole almost \$5 billion and would affect more than 80 percent of all pupils (see Table 13). Expenditure floors below \$900 would have relatively little impact on the distribution of expenditures. The principal effect of a \$700 floor would be to remove those districts at the extreme

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[3]It is assumed here that everything else remains unchanged--that the chosen policy acts only to impose the specified minimum or maximum. These figures are based on 1971-72 data (i.e., before S.B. 90 and A.B. 1267).

Table 13

EFFECTS AND COSTS OF EXPENDITURE FLOORS AND CEILINGS, 1066 DISTRICTS

Equalization Policy	Expenditures/Pupil		Added Cost of Policy, Compared with 1971-72 Actual Expenditures ($ millions)	Pupils Affected (%)
	Mean	Standard Deviation ($)		
Actual, 1971-72	901	205	0	0
$700 minimum	908	196	33	13
$800 minimum	926	181	117	36
$900 minimum	968	158	313	72
$1000 minimum	1042	129	4860	83
$1100 minimum	1127	104	5256	91
$1200 maximum	882	153	-87	6
$800 minimum and $1200 maximum	907	122	28	42

NOTE: Observations are weighted by number of pupils.

low end of the distribution. A floor of $700 or a ceiling of $1200 would have mainly cosmetic effects.[4] A floor of $1000 is probably too expensive to contemplate. One could therefore expect the political system to settle for a figure between $700 and $900 per pupil as a meaningful attempt at equalization that would not bankrupt the school finance system. Senate Bill 90 in fact established a "quasi floor" in the $800 area. It remains a quasi floor because the lowest-spending districts can only approach this goal in a gradual fashion--being limited to a 15 percent increase in total expenditures per year.

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[4] Since San Francisco's expenditures were close to $1500 in 1971-72, and since that city plays a powerful role in the state legislature, it is unrealistic to expect a plan to succeed that would require a substantial reduction in San Francisco's level of spending.

Question: District power equalizing has often been mentioned as a technique for dealing with the inequalities of local property values. How would such a plan work and what would be its effect on differences in expenditures?

A pure power-equalizing plan calls for a uniform property base applicable to every school district that would equalize the ability (or power) of each district to raise local revenues. This base could be set at the statewide average property value per pupil or at some other level, in which case the state would act to make up any deficits or collect any excess revenues. This plan would automatically meet the requirement of *Serrano* that wealth-related disparities in expenditures and tax rates be eliminated since a given tax rate would raise the same revenues in all districts, regardless of the actual local property wealth. In effect, there would be a transfer of taxing power from the wealthier to the poorer districts. There are many variations of this basic power-equalizing concept. These include alternative formulas and techniques for raising and distributing state aid, nonproportional schedules relating tax rates and revenues per pupil, and modifications on the basis of needs and costs.[5]

Most of the proposed power-equalizing plans would greatly reduce the present level of inequalities in school district expenditures. However, complete equality would not be obtained. Personal income, together with differences in the local demand for education, would manifest itself more clearly than under the present system because the masking effect of property-value differentials would be eliminated. Thus, in the analysis presented below, the highest-spending districts are predicted to be Berkeley and Palo Alto--both university towns with high demands for education. A relatively uncomplicated plan that equalized property value at the statewide average and that maintained the current average level of state aid would reduce the difference between maximum and minimum total expenditures in unified districts

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[5]For a full description of alternatives, see Barro, "Alternative Post-*Serrano* Systems and Their Expenditure Implications," op. cit.

from \$1400 per pupil to less than \$800; it would halve the standard deviation in expenditures; and it would completely remove all wealth-related differentials. On the other hand, since some districts would choose quite low tax rates and expenditure levels, while others would want to indulge their fancies for educational expenditures, the highest-spending district is predicted to spend more than twice as much as the lowest-spending one.

In order to make the kind of prediction described above, it is necessary to estimate the response of each district to the new circumstances prescribed by the various plans. This was done by means of a statistically estimated expenditure equation that permits one to predict school district responses to changes in the relevant variables:[6]

$$\ln L/ADA = -1.31 + \underset{(21)}{.646} \ln AV/ADA + \underset{(4.5)}{.048} \ln ADA - \underset{(9.5)}{.1} (TCE-L)/ADA$$

$$+ \underset{(3.6)}{.11}\, \text{Suburbs} + \underset{(3.7)}{.8}\, \text{Professional} - \underset{(2.4)}{.94}\, \text{Managers};$$

$R^2 = .87$;

S.E. = .17;

N = 227.

The school district observations were weighted by the natural logarithm of the number of pupils. The variables are: L = locally raised revenues in hundreds of dollars; ADA = pupils (average daily attendance); AV = assessed property value in tens of thousands of dollars; TCE = total current expense of education in hundreds of dollars; Suburbs = proportion of population in suburban locations; Professional = proportion of workers who are professionals; Managers = proportion of workers who are managers and administrators.[7] The term (TCE-L) is a measure of nonlocal revenues and includes state aid and federal funds. The

[6]A more extended discussion of school district expenditure models is given in Appendix A.

[7]For a detailed definition of variables, see Appendix B.

negative coefficient indicates that nonlocal funds are partial substitutes for locally raised revenues.[8]

The following analysis is confined to unified districts. The results should illuminate the basic issues and can easily be extended to all districts.

For the first simulation of district power equalizing, each district was assumed to face the statewide average assessed value per pupil of $13,000 and to receive the average amount of state aid of $315 per pupil. Federal and other revenues were assumed to remain unchanged.[9] Total expenditures are then the sum of the predicted local revenues, state aid, and federal and other revenues. Since average values of property and state aid are used in this simulation, both total expenditures on education and the split between local and state sources of funds hardly change from their actual value (see Table 14). This is an important result, since it indicates that the increased revenues raised by poorer districts are almost exactly matched by decreases in the property-rich districts.

All the measures of variability are considerably reduced by this power-equalizing plan. In Table 14, compare the actual 1971-72 figures with those of the first alternative plan. (Ignore for the moment the other plans. They will be discussed below.) The standard deviation of total expenditures is reduced by almost one-half and the difference between the maximum and minimum is lowered by more than $600.[10]

In simulations of this type, one can have much more confidence in aggregate results than in the predictions of individual district

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[8] In the above equation, an increase of nonlocal revenues of $100 would reduce locally raised revenues by 10 percent.

[9] The simulation equation has the following form: $\ln$ L/ADA = .646 $\ln$ AV/ADA - .1[illegible] nonlocal revenues. The figures given above as statewide averages were derived from the 227 unified districts in the analyzed sample.

[10] The minimum total expenditure of $615 under power equalization is predicted for the Tahoe-Truckee Unified School District. This district is one of the wealthiest, but taxes itself at a very low rate (see Table 15). A reduction in its property base from $44,000 to $13,000, together with its demonstrated low preference for educational expenditures, yields the predicted value of $615.

Table 14

PREDICTED EFFECTS OF ALTERNATIVE POWER-EQUALIZING PLANS ON PER-PUPIL LOCALLY RAISED REVENUES AND TOTAL EXPENDITURES, 227 UNIFIED SCHOOL DISTRICTS

(In dollars per pupil)

Finance Plan	Mean	Standard Deviation	Coefficient of Variation	Minimum	Maximum	Range
Actual, 1971-72						
Local revenues	563	213	.38	45	1965	1920
Total expenditures	917	169	.18	693	2105	1412
(1) *Equalized property = $13,000* *State aid = $315*						
Local revenues	554	85	.15	168	943	775
Total expenditures	916	87	.09	615	1401	786
(2) *Equalized property = $13,000* *State aid = $315* *Minimum tax = $4*						
Local revenues	570	65	.11	520	943	423
Total expenditures	932	80	.09	835	1408	573
(3) *Equalized property = $13,000* *State aid = $500* *Minimum tax = $4*						
Local revenues	528	30	.06	520	784	264
Total expenditures	1075	60	.06	10[illegible]0	1593	573
(4) *Equalized property = $20,000* *State aid = 0*						
Local revenues	1002	154	.15	304	1707	1403
Total expenditures	1049	149	.14	542	1850	1308

behavior; nevertheless, it is instructive to observe how the model treats specific districts. Table 15 shows the impact on selected districts.

One feature of the simulation is worth noting here. If a district deviated from the statistically estimated expenditure equation, the predicted values under the alternative set of conditions would maintain the same deviation. These deviations can be interpreted as the local demand for education that is independent of property value, socioeconomic status, and the other variables of the equation. This is the chief reason why there is a wide disparity in tax rates, even after property values are equalized: districts that have demonstrated a high (or low) regard for education in the past by spending more (or less) than predicted by the equation, are assumed to continue their behavior.

Question: What are some other power-equalizing plans that are seen as [illegible]?

The unconstrained behavior of school districts under the pure power-equalizing plan discussed above would lead to expenditure levels for some districts that are quite low. Minimum tax rates have been proposed to deal with this specific problem. When a $4 minimum property tax rate is added to the pure power-equalizing plan, districts must raise at least $520 through the property tax. The minimum level of total expenditures is increased to $835. These results are shown as the second alternative plan in Table 14. Because they place a limit on the lower ranges of expenditures, minimum tax rates are common features of many power-equalizing plans.

The California State Board of Education, in 1974, endorsed a gradual conversion to a plan that at the end of 5 years would provide an essentially power-equalized system.[11] A minimum property tax of $4 is

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[11] "Recommendations for Public School Support," a report prepared for the California State Board of Education by the School Support Committee, Robert Hanson, Chairman, November 14, 1974.

Table 15

EFFECT OF POWER EQUALIZATION ON SELECTED SCHOOL DISTRICTS

School District	Local Revenues per Pupil		Total Expenditures per Pupil		Effective Tax Rate[a]		Assessed Value per Pupil 1971-72
	1971-72	Power-equalized	1971-72	Power-equalized	1971-72	Power-equalized	
Beverly Hills	1615	521	1711	836	3.02	4.01	53,380
Baldwin Park	256	534	718	868	5.04	4.10	5,075
Emery	1965	501	2105	816	2.40	3.86	82,064
El Segundo	1228	433	1319	748	2.67	3.33	46,076
San Francisco	1178	638	1509	1001	3.69	4.90	31,960
Los Angeles	595	560	920	912	4.35	4.31	13,695
Berkeley	1245	943	1659	1401	6.67	7.26	18,660
Palo Alto	1354	878	1592	1193	6.00	6.75	22,551
Milpitas	493	775	858	1090	7.08	5.96	6,972
Tahoe-Truckee	818	300	925	615	1.83	2.30	44,579

NOTE: State aid was assumed to be $315 per pupil for each district, and the assessed property value per pupil was set at a statewide average of $13,000.

[a]Tax rate is calculated as the ratio of locally raised revenue to assessed value.

called for and the 50 percent state contribution established by S.B. 90 is assumed to continue. In order to guarantee a "quality" education for all pupils, it was recommended that a foundation or minimum per-pupil expenditure level be established within the current 70th and 80th percentile range because these districts "were giving their students a much more varied educational offering than those spending nearer the statewide average per pupil."[12]

To simulate the major features of this proposal, a minimum $4 tax rate was applied, state aid was assumed to be $500 per pupil, and the current average assessed value of $13,000 per pupil was used. The results of the simulation are shown as the third alternative plan in Table 14. The "quality" level of expenditures is not dealt with explicitly in the simulation, but the combination of state aid, minimum tax rate, and power equalizing yield a minimum total expenditure level of $1020 per pupil, which would have been at approximately the 85th percentile of unified districts in 1971-72, or within the desired range of the 70th to 80th percentile, given the changes brought about by the S.B. 90 and A.B. 1267 legislation in the 2 years following 1971-72.

The effect of the minimum tax rate, which is equivalent to a statewide property tax, is to eliminate the left-hand tail of the distribution of locally raised revenues and total expenditures. This is graphically demonstrated by the distributions shown in Fig. 9. Under this plan, property taxes account for 49 percent of total revenues, state funds yield 46 percent, and federal funds make up the remaining 5 percent. All the measures of variability are considerably reduced; e.g., the standard deviation and coefficient of variation of total expenditures are reduced to one-third of the actual 1971-72 numbers. The difference between the maximum and minimum expenditure figures is now only $573, and none of that variation is due to wealth-related causes.

The average per-pupil expenditure figure under this version of the State Board plan is $1075, or $158 more than the actual 1971-72 amount. Generalizing this increase to the state as a whole would require the state to spend approximately $3 to $4 billion more for

[12] Ibid., p. 4.

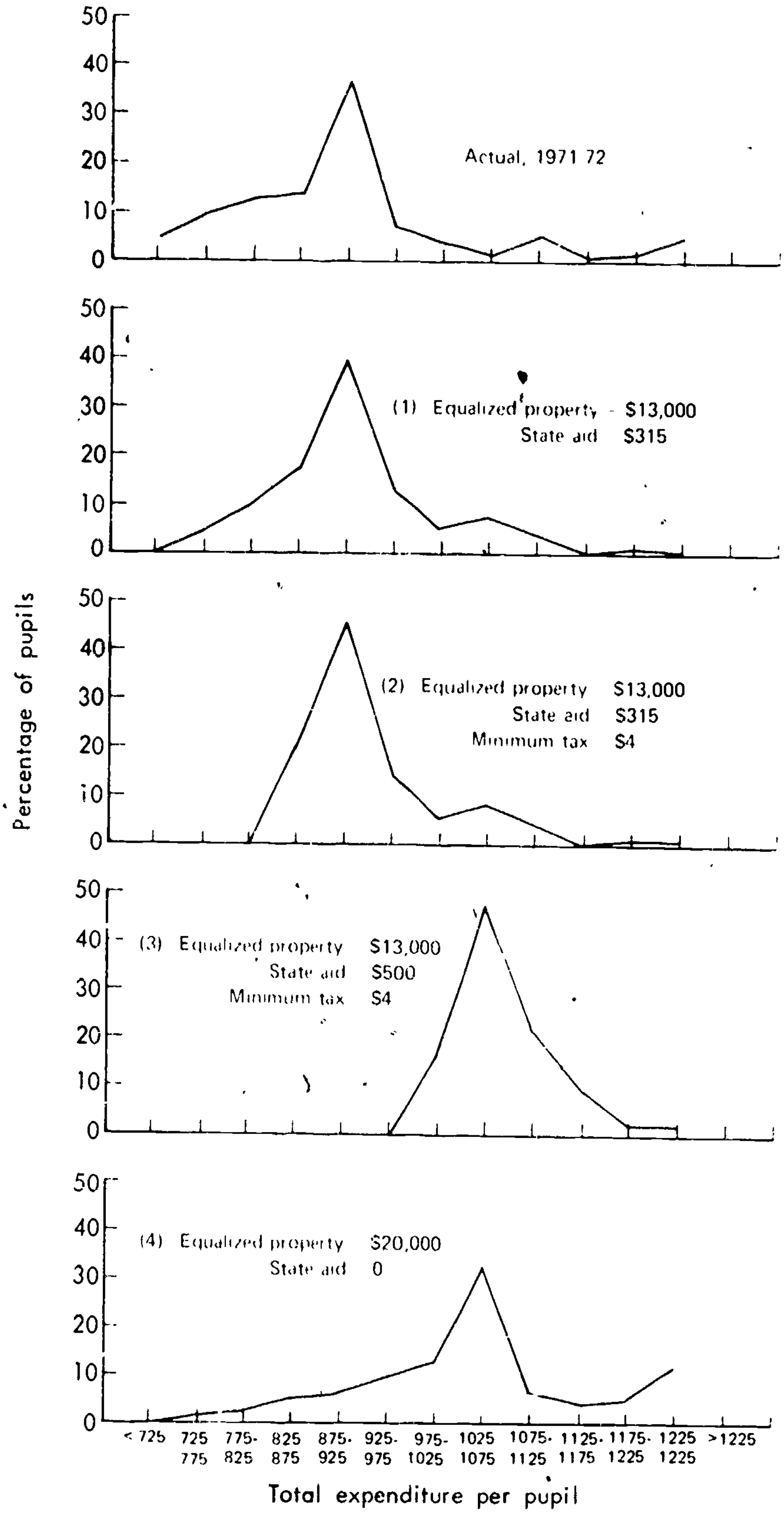

Fig. 9--Simulated distributions of per-pupil total expenditures generated by four alternative power-equalizing plans for unified districts

education. This estimate is based on the conditions existing in 1971-72. A more realistic estimate must take into account the changes brought about by legislation in the intervening years, inflation, and the details of the phase-in scheme recommended by the State Board. These estimates range from $1.4 billion to more than $3 billion.[13] A simpler way to look at the increases is to note that the predicted average per-pupil-expenditure level is 17 percent greater than the existing level. Applying this increase to 1974-75 expenditures of $5.3 billion yields a cost of $900 million. Whatever the actual cost would be, increases of this magnitude would be substantial.

A fourth power-equalizing plan was analyzed that would guarantee a tax base of $20,000 per pupil to each school district and reduce the lump-sum state aid to zero. The difference between the taxes that are raised from existing property and the revenues required according to the computational (fictitious) base must be supplied from general state revenues. Many of the variability measures for this plan are only slightly better than the actual values obtaining in 1971-72 (see the fourth alternative plan in Table 14 and in Fig. 9). Because of the absence of lump-sum state aid, those districts that chose low tax rates would also end up with low total expenditures. Thus, in the absence of mandated minimum tax rates or substantial amounts of state aid, a considerable number of pup would experience a substandard educational program--despite the fact that the property base would be equal for all districts and 50 percent higher than the current base.

The relative inequality of two of the alternative power-equalizing plans are plotted in the Lorenz curves of Fig. 10. The State Board plan comes as close to equality for locally raised revenues as any of the curves seen so far in this report. These results carry over to total expenditures. Under the State Board plan, 50 percent of the pupils would receive 48.5 percent of total revenues.

District power equalizing would not eliminate all disparities in educational expenditures--only those related to local property wealth.

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[13] See [illegible], "School Financing Plan Faces Many Obstacles," November 29, 1974.

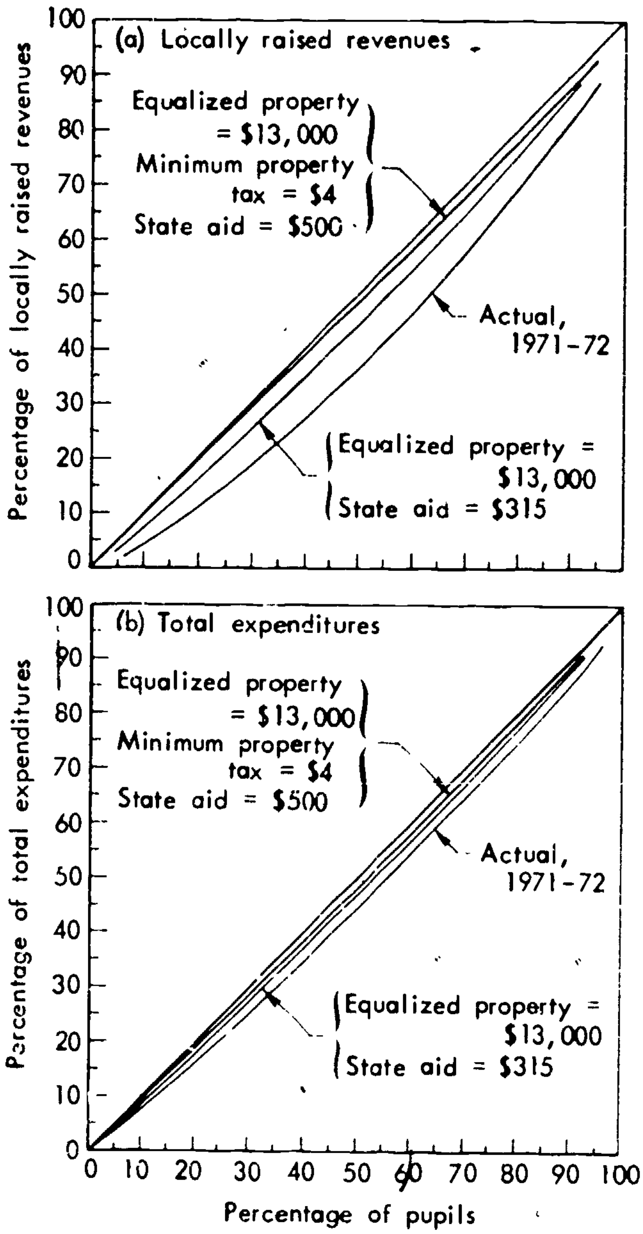

Fig. 10--Lorenz curves showing effects of alternative power-equalizing plans on inequality of per-pupil locally raised revenues and total expenditures for unified districts

As can be seen from the few examples considered here, the remaining inequalities depend on the specific details of each plan and on the degree of unconstrained choice given to each school district--details that would be subject to the intense scrutiny of the political process.

[illegible]

One of the main purposes of district unification is to achieve larger size districts; whether one speaks about consolidation or unification, the analysis is much the same. These policies would certainly reduce the variability of the relevant variables related to school finance, as the preceding discussion has clearly demonstrated, but the extent of their effect would depend very much on just which measure of variability is examined.

One of the chief obstacles to equalization in educational expenditures is the extreme variation in wealth found among small-size neighboring districts. A major effect of unification or consolidation would be to lessen the disparity between extreme property wealth and educational expenditure. There would be little effect on the more aggregative measures of inequality, mainly because most pupils are already members of large school districts. It is well to remember that although more than half of all school districts have populations of less than 5000, these districts account for only 6 to 7 percent of all pupils; and the proportion of pupils in districts at the extreme ends of the distribution is even smaller. If concern is with the simple existence of districts with very high or low wealth and educational expenditures, consolidation or unification will help to eliminate the wide disparities, but it will not affect the majority of pupils.

Reorganization of school district boundaries, though, to even out the extreme variations in wealth might permit more straightforward school district reform proposals to be enacted, since they would not need to accommodate to these existing variations. However, one could also reverse the direction of the above argument: given an equitable school finance system, school district reorganization might be easier

to attain.[14] In fact, legislatively mandated reforms with clearly specified enactment dates could induce the very reorganization that would make reform more meaningful.

[illegible]

Amending state constitutions to allow wealth-related disparities in school expenditures to continue could solve the [illegible] problems, but the inequalities would remain. The large number of law suits calling for the elimination of inequality and the smaller, but significant, number of court decisions that have declared existing systems to be invalid suggest that the issue is broader than a purely judicial theory of equal protection.[15]

One could argue that the issue is being stimulated by a number of activist lawyers who have developed a sound legal theory and a successful judicial strategy that has illuminated an area of serious inequality, but that the issues are without a constituency, formed by an alliance of interests, who stand to gain from the elimination of inequality.[16] The natural constituency for greater equality includes the administrators, parents, and residents of low-wealth districts, who are generally inactive politically. The beneficiaries of the present

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[14] This is the argument presented in "Recommendations for Public School Support," op. cit., p. 26.

[15] As of mid-1972, there were more than 50 active law suits challenging state school finance systems throughout the country. (See, R. Stephen Browning and Myron Lehtman, "Law Suits Challenging State School Finance Systems," in [illegible], Select Committee on Equal Educational Opportunity, United States Senate, September 1972.)

[16] This paragraph closely follows the argument presented in the excellent political analysis of Meltsner and Nakamura of the difficulties encountered in putting together school finance reform proposals. (See Arnold J. Meltsner and Robert T. Nakamura, "Political Implications of [illegible]," in John Pincus (ed.), [illegible] (Cambridge, Mass.: Ballinger Publishing Co.), 1974.)

system include both the politically active wealthy districts and those interests most likely to be hurt by statewide increases in property taxes--agriculture, utilities, railroads, and oil companies. Also, since equalization would probably entail increased state spending, opponents to the increased cost of government are allies of the anti-equalization lobbies. Thus, there is only a politically impotent handful who stand to gain from reform and a wide range of powerful interests opposing it.

The absence of a well-defined equality constituency explains the great difficulty faced by state legislatures in putting together viable educational reform proposals. For example, repeated failure has marked the New Jersey legislature's attempts to meet the requirements for a "thorough and efficient" system of education as specified by the state constitution and affirmed by the courts in [illegible] v. [illegible].[17] The president of the New Jersey Senate, reportedly with tongue in cheek, proposed "the simplest thing to do--do away with the words 'thorough and efficient' in the constitution."[18] A California tax attorney and politician has also suggested that "supporters of the [illegible] decision probably do not constitute a major political constituency.... An amendment to the state constitution wholly or partly nullifying [illegible] could satisfy practically everyone, with minimum political costs."[19]

Nevertheless, so far there has been no obvious active movement to amend state constitutions in the manner suggested above. The amendment process in general is a very arduous one, requiring financial resources and wide public support to overcome many procedural and political hurdles. Constitutional amendments to eliminate the need for school finance reform would face as many obstacles and be as difficult to achieve as the task of constructing a legislative majority to support reform. Moreover, not many people would be likely to rally to a cry for inequality.

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[17] 62 N.J. 473.

[18] "Lawmakers in Tax-wary New Jersey Debate Competing Plans to Equalize School Financing," [illegible], November 8, 1974, p. 30.

[19] Minot W. Tripp, "An Easy Way Out of [illegible]: Legalizing the Status Quo," [illegible], June 1974, p. 204.

A more probable outcome is for legislatures to respond to the mandates of the courts by foot-dragging and by doing as little as possible, unless the demands by the courts become so insistent, or a shift in public values so widespread, that change in the desired direction becomes possible. The stimulus of the courts and the documented and publicized extremes of inequality may have led to just such a movement in state legislatures to do something about inequality despite the opposition of well-placed interests and the lack of an effective interest-oriented constituency.

California's passage of tax and financial reform in 1972 and significant reform legislation in Florida, Kansas, Maine, Michigan, Minnesota, and Utah suggest that the constituency for reform has broadened to the general electorate. I would predict that the future course of school finance will see, not the passage of constitutional amendments to rule out the need for reform, but a movement toward substantial equality. Even if change is only evolutionary and incremental, cumulative movement over time can be substantial when the direction of change is strongly biased toward greater equality.

Appendix A

THE ESTIMATION OF SCHOOL DISTRICT EXPENDITURE EQUATIONS

An important use of behavioral theories in policy analysis is to predict the effects of changes in the structure or parameters of systems. The generality of the theory often depends on the scope of the analyzed changes. Both major reforms and the analysis of units with highly diverse institutional structures require fairly broad theories to encompass the wide variations in the underlying observations. Minor alterations to an existing system can be successfully analyzed by quite narrow theories. For example, the understanding of the determinants of educational expenditures in one country over long periods of time, or in many countries for a single time period, requires the use of a general theory. Institutions are so different that they act as random effects on the more basic forces influencing expenditures. On the other hand, if one is looking at expenditure relationships within a single state at a given time period, the specific institutional structure and the variations deriving from it are likely to be the dominant factors contributing to an understanding of the differences in expenditures. In this instance, a narrow theory that recognizes the specific effects of the given institutions may be a good predictor of those changes that leave the institutional structure basically unaltered. In this report, the policy problem is more like the second case than the first. Reforms that dispense with existing institutions are not contemplated. Since the future school finance system will probably possess most of the same attributes of the present system, the theory can be founded on a fairly narrow basis.

The most important institutional feature of the present system is the use of the property tax as the main source of educational finance. So long as property taxes remain the primary source of revenue, the property base from which taxes are raised must be considered the principal determinant of local school district financial behavior.

In fact, however, most theories on district expenditures are based on choice-theoretic, utility-maximizing assumptions of microeconomics,

where education is one of the goods purchased by the individual consumer. The usual variables of income and price enter into these formulations, and often such other variables as the ratio of pupils to total population, the ratio of residential to total property, educational preferences as based on socioeconomic indicators, etc. Unfortunately, to carry these theories forward to the stage where they can be confronted with data, specific functional forms for the presumed utility functions are required. It is at this point that the theories meet reality. Convenient estimating equations are often drawn out of whole (or almost whole) cloth. A problem here is that a large number of reasonable theories could lead to the same estimating equation, and the statistical tests could not distinguish between them.[1]

A more serious objection, though, concerns the reasonableness of the original assumptions. Public education is not purchased by individual consumers in a market, or even by public "decisionmakers," but is provided by elected bodies and highly bureaucratized organizations. The technology by which education is produced is not well understood. Even the notion of what education is or ought to be is subject to considerable debate.

In order to estimate an equation for predicting school district behavior for this report, broadly conceived theories based on choice-theoretic notions of individual behavior have been eschewed. Rather, the following criteria have been adhered to: Do the variables and functional forms make sense? Are the predictions reasonable? Are the estimated coefficients stable as minor changes are made to the equation? Does the equation account for a large percentage of the variance (high R^2), and are the coefficients statistically significant? The equation actually used in the simulation meets these criteria, but many others were investigated as well.

One of the better theoretical papers on school district expenditures suggested an equation for locally raised revenues with a

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[1] For an example of three models leading to the same estimating equation, see Stephen J. Carroll, [illegible], The Rand Corporation, R-1308-HEW, October 1973.

reasonable set of variables that did not, however, include the assessed value of local property.[2] The present investigation began with this equation. The variables were average family income, pupils per family, state and federal aid per pupil, and percent of total property that is residential. State and federal aid can be considered as substitutes for local revenues and so would have a negative effect on the amount school districts would want to raise from local sources. If they were perfect substitutes, the coefficients on these variables would be -1; if they were not thought of as substitutes at all, the coefficients would be zero.[3]

The variable, percent residential property, is intended to measure the effect--if any--of the leverage obtained from property taxes not paid by individuals. That is, if 80 percent of a district's property is nonresidential, every tax dollar paid by individuals would be matched by 4 dollars of business taxes. This leverage would be expected to increase the amount that local citizens would wish to tax themselves, since their own taxes would be multiplied by the revenues from the nonresidential property. The coefficient on this variable should therefore be negative.[4] Unfortunately, this variable was only available for the handful of districts for which the total assessed value was split into separate categories. However, the census provided data on the market value of owner-occupied residences and on the monthly rental value of renter-occupied residences.

In order to calculate the value of total residential property, it was necessary to convert the monthly rental value into a market value equivalent to the figures for owner-occupied property. With the 136 school districts for which a breakdown of assessed value was available,

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[2] Stephen R. Barro, *[illegible] District Expendi- [illegible] in-aid*, The Rand Corporation, R-867-FF, February 1972.

[3] It is assumed that state and federal aid is not directly related to local tax rates--i.e., allocation of these funds is mostly determined by local characteristics (such as wealth) that are beyond the control of the local school district.

[4] This effect is present to the extent that residents believe that they bear none of this local tax on nonresidential property.

an equation was estimated in which the total assessed value of residential property (AVRP) was the dependent variable, and the census values of aggregate owner-occupied and renter-occupied property were the independent variables.[5] For this technique to be successful, the constant term of the equation should be close to zero, the coefficient of owner-occupied property should be 1, and the coefficient of rental property should be between 50 and 100--i.e., the market selling price of rental property should be 50 to 100 times the monthly rent. Thus, the estimated equation was as follows:

$$\text{AVRP} = 1.86 \cdot 10^6 + \underset{(21)}{1.08} \text{ owner-occupied}$$

$$+ \underset{(10.9)}{74.8} \text{ renter-occupied;}$$

$$R^2 = .96;$$

$$N = 136,$$

where all variables are measured in $\$ \cdot 10^4$; t-statistics are shown in parentheses. The coefficients were as expected. The constant term was only 5 percent of the mean value of the dependent variable, and the other coefficients were in the expected range. A check with a leading Los Angeles real estate company confirmed the estimate of 75 as an appropriate ratio of selling price to monthly rent. This equation was then used to estimate the value of residential property for the full sample of unified school districts.

Equation (1) of Table A.1 is a simple linear version of the theoretically derived estimating equation. The elasticity of local revenues with respect to family income is about 0.6 in this equation. The other variables have the expected signs and are statistically significant. The coefficient for state aid however is too high, suggesting that districts overcompensate for state revenues. In Equation (2), socioeconomic variables were added to account for possible differences in preferences

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[5]The figures for assessed value of residential property were multiplied by four to convert them to market values.

Table A.1

SELECTED EQUATIONS FOR LOCALLY RAISED REVENUES PER PUPIL ($\times 10^2$) IN UNIFIED SCHOOL DISTRICTS (1971-72)

Variable	Equation 1	2	3	4	5	6[a]
R^2	.586	.733	.809	.874	.893	.874
Standard error	1.39	1.12	.95	.77	.71	.17
N	227	227	227	227	227	227
Constant	10.21	8.09	2.17	2.14	-1.84	1.31
Residential property, %	-3.45 (4.4)	-4.82 (7.2)	.41 (.7)	-.91 (1.8)		
Average family income $\times 10^2$	.026 (5.1)	.032 (5.7)	.009 (2.7)	.017 (4.5)	.026 (5.6)	
Pupils/family	-.94 (4.0)	-.597 (3.0)	-.11 (.6)	-.07 (.5)		
State aid/pupil $\times 10^2$	-1.47 (6.6)	-.928 (4.7)	-.38 (2.3)	-.22 (1.6)		
Federal aid/pupil $\times 10^2$	-.41 (2.5)	-.545 (3.9)	-.21 (1.9)	-.35 (3.7)		
Education, college, %		15.8 (8.3)		6.28 (8.1)	4.41 (6.4)	
Occupation, professional, %		-29.9 (6.5)				.80 (3.7)
Occupation, managerial, %		-14.5 (4.1)		-25.5 (8.1)	-25.8 (7.4)	-.94 (2.4)
Assessed value/pupil $\times 10^4$			2.59 (16.0)	2.28 (16.8)	4.16 (18.0)	.65[a] (21)
(Assessed value/pupil)^2					-.35 (7.1)	
Income < \$5000, %					3.74 (2.7)	
Urban, %					-.54 (3.9)	
Rural, %					-1.04 (2.8)	
Suburbs, %						.11 (3.6)
Nonlocal revenues/pupil $\times 10^2$						-.10 (9.5)
Pupils						.05[a] (4.5)

NOTE: District observations are weighted by number of pupils in Equations 1 through 5, and by the natural logarithm of pupils in Equation 6; the t-statistics are in parentheses; variables are defined in Appendix B.

[a]The dependent variable and other variables (as noted) are in natural logarithm.

for education; these variables were the percentages of the working population in professional and managerial occupations, and the percentage with some college education. These variables were very significant and greatly improved the overall fit of the equation: the R^2 rose from 0.59 to 0.73, income elasticity rose to 0.70, and the coefficient on state aid took on a reasonable value. This equation was used in a trial simulation of district power equalizing, but the results were unsatisfactory. For example, Emery Unified School District would have its assessed value per pupil reduced from $82,000 to $13,000, and yet the equation only predicted a reduction of locally raised revenues from $1965 to $1873--implying a tax rate under the new system of more than $14. Since the highest effective tax rate in the sample of unified districts was only $7, this prediction was considered to be unreasonable.[6]

Assessed value per pupil was then added to Equation (1), which became Equation (3) in Table A.1. This variable was highly significant and raised the R^2 from 0.59 to 0.81. It also greatly reduced the significance of the other variables. Some of the socioeconomic educational preference variables were then added, as is shown in Equation (4) of Table A.1. A simulation based on this equation, while better than that based on Equation (2), was still found wanting--particularly for low values of assessed property, where extremely low levels of local revenues were predicted. A quadratic term for assessed value was therefore added to the equation to allow for some curvature in the function. (See Equation (5).) Again, the fit of the equation was improved; however, some of the previously included variables considered above were not at all significant and so were omitted. The quadratic curve of local revenues versus assessed value rose until it reached a peak at about $60,000 per pupil, and then fell. Unfortunately, this equation also produced some unacceptable predictions because of the position of the maximum in the quadratic.

Semilogarithmic forms were tried without success. Equation (6),

[6] Other simulated tax rates ranged unrealistically, from 50¢ to more than $10.

which was logarithmic in the dependent variable and in assessed value per pupil and number of pupils, worked quite well. This equation combined state and federal revenues into a single variable called nonlocal revenues. Depending on the inclusion of other variables, the statistical significance of income varied, and so it was omitted. The coefficients in Equation (6) are reasonable, the statistics are satisfactory, and the simulation results are acceptable. The logarithmic equation was therefore used for the district power equalization simulation discussed in Section V.

Appendix B

DEFINITION AND SOURCE OF VARIABLES

[illegible]. Average daily attendance, 1971-72 (from Department of Education file, *School District Income Data*).

Total current expenditures. Total current expense of education, 1971-72 (from *Annual Financial and Budget Report, J-41*).

Locally raised revenues. Revenues raised through district taxes on property, 1971-72 (from *Annual Financial and Budget Report, J-41*).

State aid. Total state income of school district (from *Annual Financial and Budget Report, J-41*).

Federal revenues. Total federal revenues received ~~by~~ school district from federal sources, state sources, county sources, ~~local~~ sources, and combined state and federal sources (from *Annual Financial and Budget Report, J-41*).

Nonlocal revenues. Total current expense of education minus locally raised revenues.

Assessed value. Equalized assessed property value (one-quarter of market value), 1971-72 (from Department of Education file, *School District Income Data*).

Family income. Aggregate income accruing to families divided by number of families (from 1970 Census).

Income less than 5000. Ratio of families with annual family income less than $5000 to all families (from 1970 Census).

Owner-occupied. Aggregate value of owner-occupied housing units (from 1970 Census).

Renter-occupied. Aggregate monthly rental value of renter-occupied housing units (from 1970 Census).

Residential/total property. Ratio of aggregate value of owner-occupied and renter-occupied housing units to four times the equalized assessed value. (See Appendix A for derivation of this variable.)

Rural. Ratio of persons living in rural areas to all persons in school district (from 1970 Census).

Urban. Ratio of persons living in central city of an urbanized area to all persons in school district (from 1970 Census).

Suburban. Ratio of persons living in urban localities (greater than 2500 population) of an urbanized area (except the central city) to all persons in school district (from 1970 Census).

Occupation, professional. Ratio of professional, technical, and kindred workers to all employed persons 16 years old and over (from 1970 Census).

Occupation, managerial. Ratio of managers and administrators (except farm) to all employed persons 16 years and over (from 1970 Census).

Education, college. Ratio of males (age 20-49) and females (age 15-44) with 1 or more years of college education to all males and females in the same age groups (from 1970 Census).